Mine & Smelter Supply Co.

Denver.

TN347 Mine and Smelter Supply Co.
M52 Mining and milling
machinery

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The Mine
and
Smelter Supply Co.

Mining and Milling Machinery

The Largest Supply House in the West

DENVER, COLO.

1081

INTRODUCTION.

In issuing our new catalogue, we have endeavored to compile a book which will be of service to our friends and patrons, as a book of daily reference.

We have endeavored to set forth our various lines as completely and yet as concisely as possible. The various tables printed throughout the book, we trust will be found useful to the Mining, Mill and Smelter Men, Engineers, Machinists, and others, in figuring on the construction of work of various kinds.

Special attention is called to the quality of our goods, which we aim to keep at a high standard. We cannot agree to compete with inferior goods, but will always aim to supply the best quality at the lowest possible price.

All orders sent us by mail, will receive the same careful and prompt attention that is bestowed on those forwarded us by our traveling salesmen, and will be invoiced at prices equally as favorable.

With largely increased facilities and large stocks, we shall be enabled to make very prompt shipment of orders of all standard goods. Special goods or special sizes will be shipped from factories as soon as the conditions will permit.

As changes in manufacturers' lists occur quite frequently, we are obliged to make our lists ***"subject to change without notice."*** *We cannot guarantee to keep our customers informed of every change in lists as they occur, although we shall issue, and mail as promptly as possible, revised lists covering such changes, for pasting in catalogue.*

Soliciting your continued favors.

Respectfully,

THE MINE AND SMELTER SUPPLY CO.

DENVER, COLO.

THE MERCHANTS PUBLISHING CO.
PRINTERS AND BINDERS,
DENVER, COLO.

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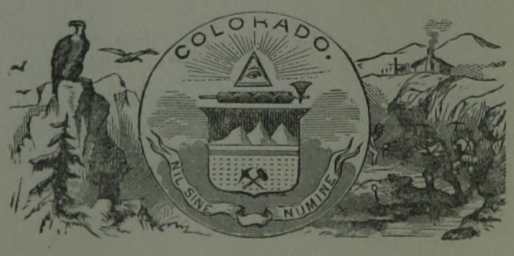
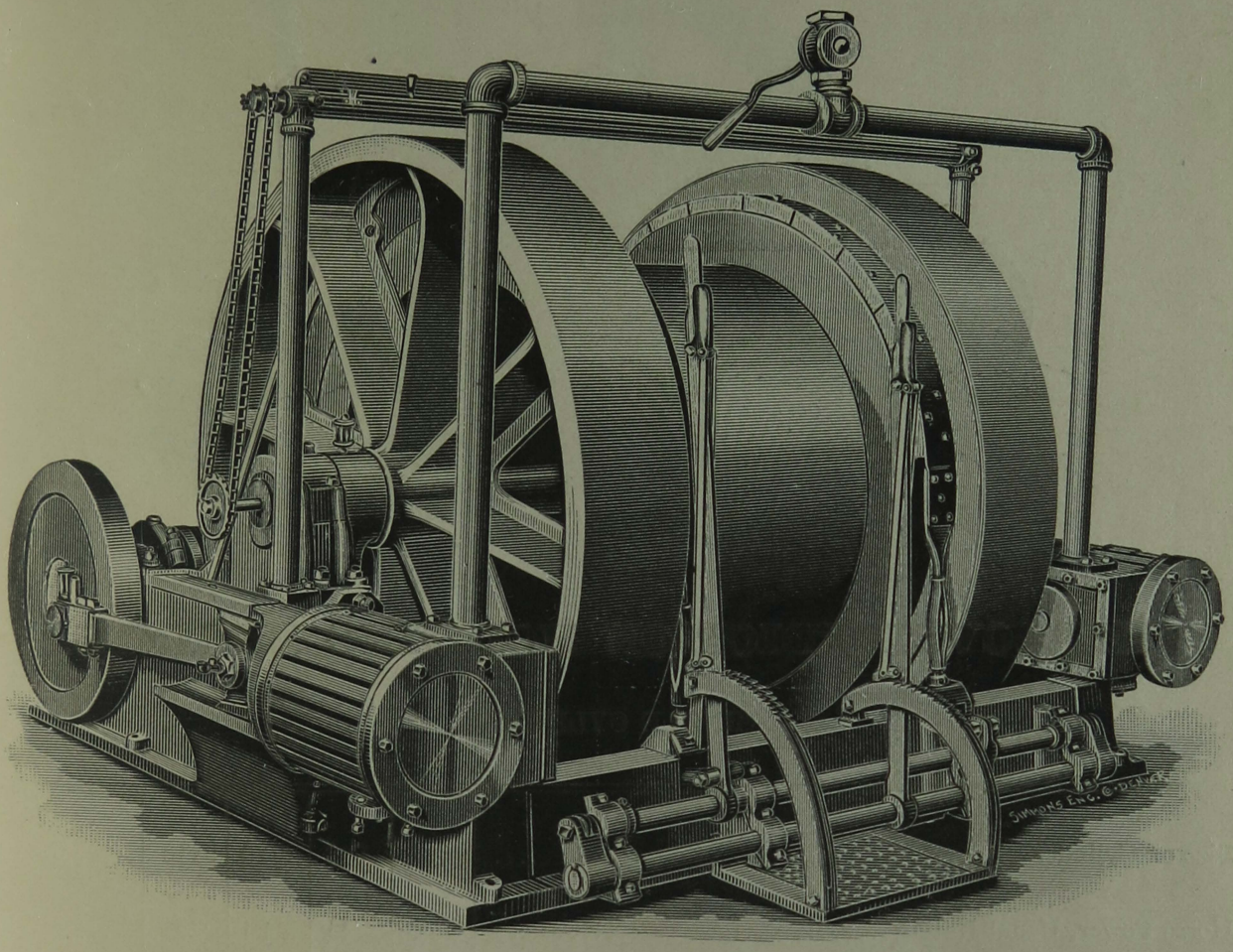


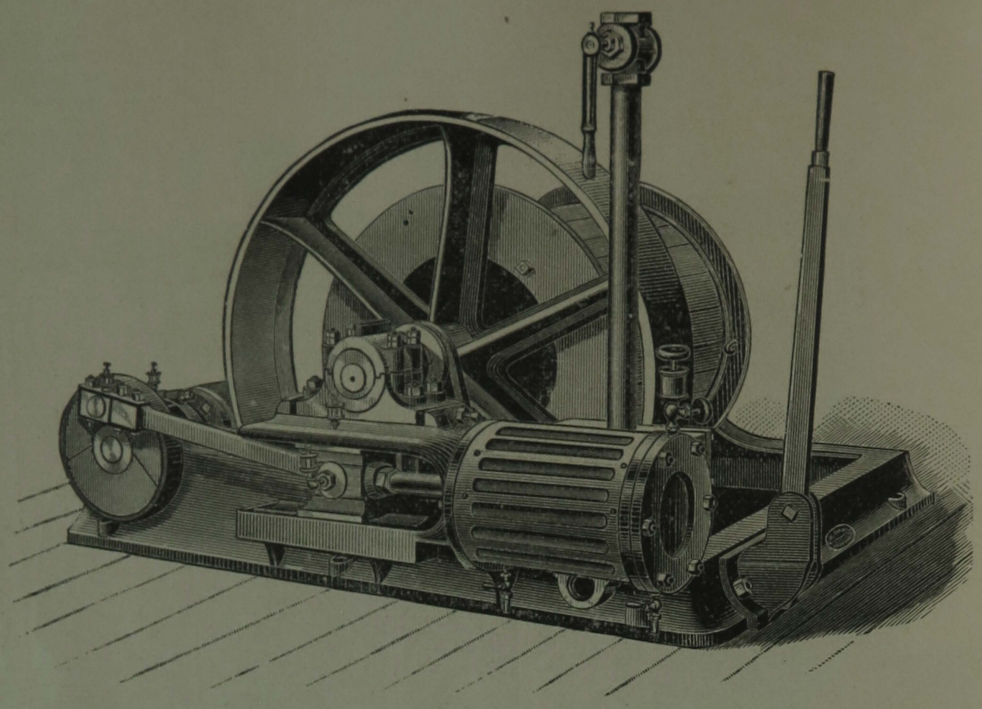


IMPROVED FRICTION HOISTING ENGINES.

DOUBLE CYLINDER.

CYLINDERS.		Usual Rating, Horse Power	Usual Speed Hoisting per Minute.	Shipping Weight, Lbs.	Load Hoisted, Lbs.	FRICTION WELLS.			Steam Pipe.	Exhaust.	Prices on Application.
Diameter.	Stroke.					Large.	Small.	Face.			
6 in.	8 in.	20	300 ft.	4,500	2,000	44 in.	6½ in.	6 in.	2 in.	2 in.	
7½ "	9 "	30	400 "	6,000	3,500	45 "	8½ "	7 "	2 "	2 "	
8 "	10 "	35	400 "	7,000	4,000	54 "	10½ "	8¼ "	2½ "	2½ "	
9 "	10 "	40	500 "	7,500	4,500	59 "	10½ "	8¼ "	2½ "	2½ "	
10 "	10 "	45	500 "	8,000	5,000	72 "	12 "	12 "	3 "	3 "	
10 "	14 "	50	600 "	13,500	6,000	72 "	13 "	15 "	3 "	3 "	
12 "	14 "	80	600 "	21,000	8,000	96 "	13 "	15 "	4 "	4 "	

Single Hoister, 5x6 Cylinder, complete on cast iron bed plate, with 8-horse power boiler, all complete with injector and fittings, rope and buckets included. $450.00.



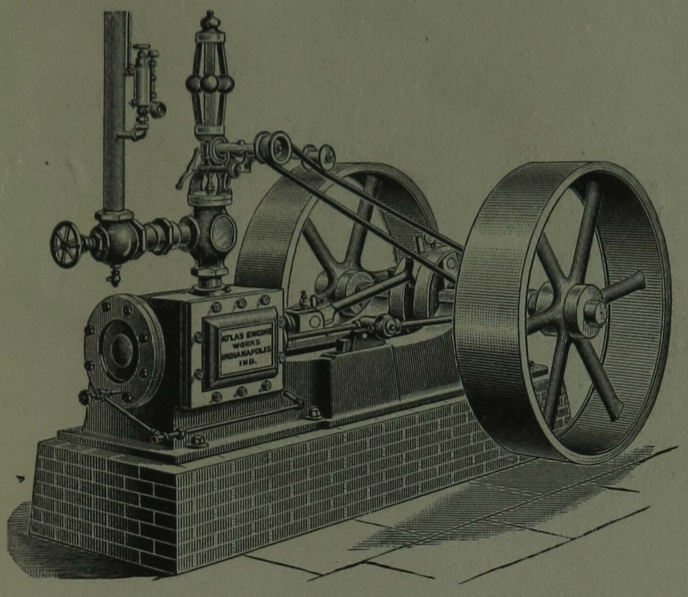
IMPROVED FRICTION HOISTING ENGINES.

SINGLE CYLINDER.

Size of Cylinder		5x6	6x8	7½x9	9x10	.....
Horse Power, Usual Rating		6	14	20	25	.....
Usual Speed of Hoisting, feet per minute		150	200	300	400	.....
Average Weight Hoisted		1000	1800	2200	2500	.....
Diameter of Drum	Inches	12	18	22	30	.....
Width of Drum	"	19	23	23	31	.....
Diameter of Large Friction	"	30	36	45	50	.....
Diameter of Small Friction	"	5	6	9	10	.....
Face of Friction	"	5	6	7	8	.....
Size of Steam Pipe	"	1	1½	1½	2	.....
Estimated Shipping Weight	Lbs.	1400	2250	3300	4400	.....

Blue Prints showing foundation plan accompanying each Engine.

PRICES ON APPLICATION.



PLAIN SELF-CONTAINED ENGINES.

CLASS A.

SPECIFICATIONS.

Estimate Number.	Dimensions of Cylinder.		Nominal Rated Horse Power	Standard Revolutions per Minute.	Two Band Wheels.		Diameter of Main Shaft. Inches.	Diameter of Steam Pipe. Inches.	Diameter of Exhaust Pipe. Inches.	Floor Space Required. Approximate.				Shipping Weight.
										Length.		Width.		
	Diam. Inches.	Stroke. Inches.			Diam. Inches.	Width of Belt. Inches.				Feet.	Inches.	Feet.	Inches.	Pounds Approxim.
7A	7	10	10	200	40	7	$2\frac{15}{16}$	$1\frac{1}{2}$	2	7	0	3	8	1,800
8A	8	10	15	200	40	7	$2\frac{15}{16}$	2	$2\frac{1}{2}$	7	0	3	8	1,800
9A	9	12	20	185	42	9	$3\frac{7}{16}$	2	3	7	9	4	8	3,200
10A	10	12	25	185	42	9	$3\frac{7}{16}$	$2\frac{1}{2}$	$3\frac{1}{2}$	7	9	4	8	3,200
11A	11	14	30	170	48	12	$4\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	9	2	5	7	4,500
12A	12	14	40	170	48	12	$4\frac{1}{2}$	3	4	9	2	5	7	4,500

Each Engine is furnished with wrought iron main shaft, two band wheels, governor, governor belt, stop valve, automatic sight-feed cylinder lubricator and connections, oil can, oil cups, wrenches and cylinder drain pipes and valves.

OVER 11,000 ENGINES IN DAILY SERVICE. WE REFER TO ANY OF THEM.

The Engine above illustrated and described is designed specially to meet the demand for a strong simple Engine.

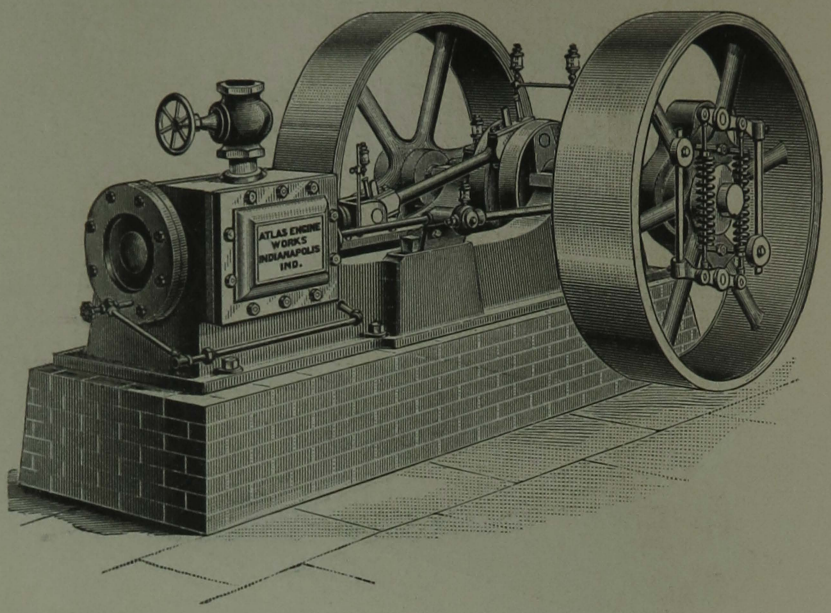
It has two discs or cranks and embodies the second bearing in the bed casting, and produces the Complete Self-Contained Engine free from the outboard bearing, sometimes objectionable for the smaller Engines.

All parts are constructed on the interchangeable plan.

Attention is called to the general Solidity of the Parts.

It is intended to be without question the best Engine of its class offered in the market, and the Company has no hesitation in claiming its merits, and offering it to the trade with full endorsement.

PRICES ON APPLICATION.



AUTOMATIC SELF-CONTAINED ENGINES.

CLASS B.

SPECIFICATIONS.

Estimate Number.	Dimensions of Cylinder.		H. P. at Given Revolutions per Minute with 40 lbs. Mean Effective Pressure.				Two Band Wheels.		Diameter of Main Shaft. Inches.	Diameter of Steam Pipe. Inches.	Diameter of Exhaust Pipe. Inches.	Floor Space Required. Approximate.				Shipping Weight
	Diam. Inches.	Stroke. Inches.	Indic. Horse Power.	Stand. Revs. pr. Min.	Indic. Horse Power.	Revols. per Minute	Diam. Inches.	Width of Belt. Inches.				Length.		Width.		Pounds Appr.
												Ft.	In.	Ft.	In.	
7 B	7	10	18	240	21	275	40	7	$2\frac{15}{16}$	$1\frac{1}{2}$	2	7	0	3	8	1,900
8 B	8	10	24	240	28	275	40	7	$2\frac{15}{16}$	2	$2\frac{1}{2}$	7	0	3	8	1,900
9 B	9	12	35	225	40	260	42	9	$3\frac{7}{16}$	2	3	7	9	4	8	3,400
10 B	10	12	43	225	50	260	42	9	$3\frac{7}{16}$	$2\frac{1}{2}$	$3\frac{1}{2}$	7	9	4	8	3,400
11 B	11	14	53	200	62	230	48	12	$4\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	9	2	5	7	4,800
12 B	12	14	65	200	74	230	48	12	$4\frac{1}{2}$	3	4	9	2	5	7	4,800

Each Engine is furnished with Wrought Iron Main Shaft, Two Band Wheels, Automatic Shaft Governor, Balanced Slide Valve, Stop Valve, Automatic Sight Feed Cylinder Lubricator and Connections, Bracket Wipe Oilers for Cross-Head Pin and Crank Pin, Drip Oiler for Eccentric, and Special Oilers for Main Bearings, Valve Cross-Head and Main Cross-Head Guide Caps, Oil Can, Wrenches and Cylinder Drain Pipes and Valves.

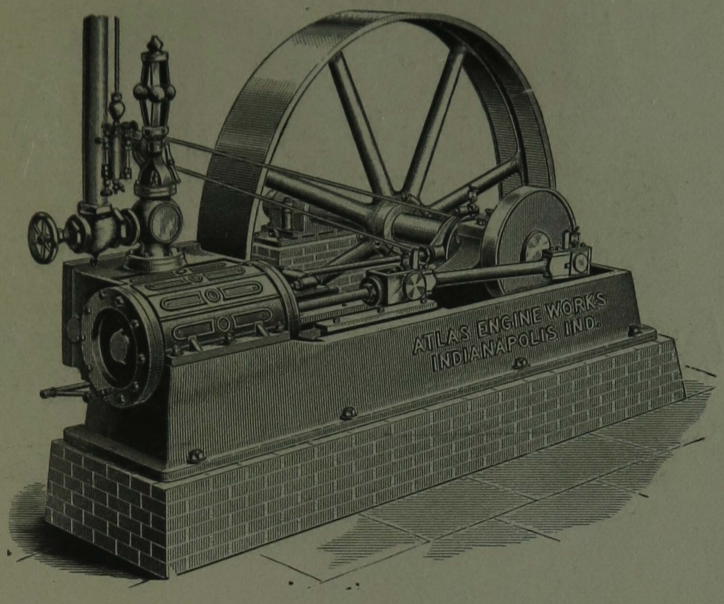
IF YOU ARE NOT A MECHANIC ASK ANY HARD SENSE MAN OF EXPERIENCE HIS OPINION OF THIS ENGINE.

Our Automatic Self-Contained Engine, presented in the above picture and Specifications, is offered to such of our patrons as are in need of perfect regulation for Electric Light or other close work, and those to whom economy in fuel is important. It is a very solid piece of work, with long Bearings and large Pins, and can be safely run to higher speed than common to plain Engines.

It is the same as the Engine shown on page 3 with the exception of the Governing Mechanism and the Balanced Valve.

The Engine with its special Governor and Valve form the most attractive Self-Contained Automatic Engine in the market; perfect regulation, economy in the use of fuel and a reasonable price being taken into consideration.

PRICES ON APPLICATION.



PLAIN SIDE CRANK ENGINES.

CLASS C.

SPECIFICATIONS.

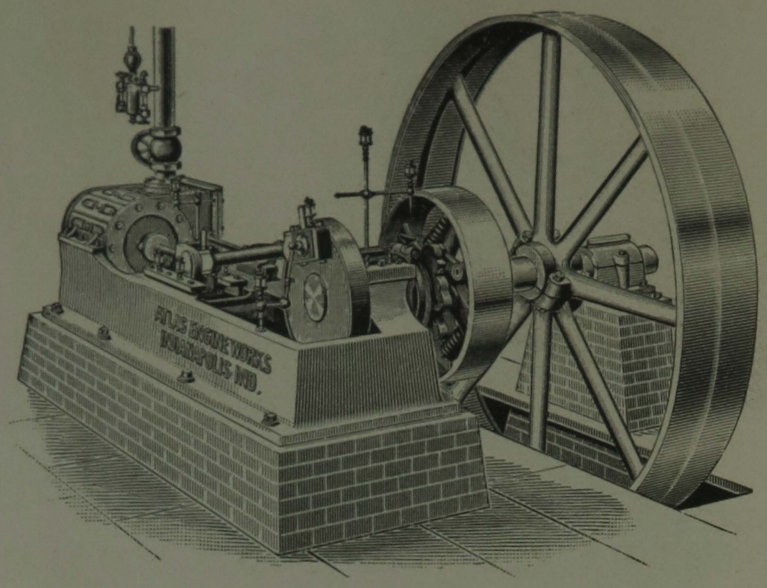
Estimate Number.	Dimensions of Cylinder.		Nominal Rated Horse Power	Standard Revolutions per Minute.	Band Wheel.			Main Shaft.		Diameter of Steam Pipe. Inches.	Diameter of Exhaust Pipe. Inches.	Floor Space Required. Approximate.				Shipping Weight
	Diam. Inches.	Stroke. Inches.			Diam. Inches.	Width of Belt. Inches.	Weight Pounds	Diam. Inches	Cent. of Engine to End of Shaft Inches.			Length. Ft.	Length. In.	Width. Ft.	Width. In.	Pounds Appr.
7 C	7	10	10	200	40	8	300	$2\frac{15}{16}$	55	$1\frac{1}{2}$	2	7	0	5	9	1,700
8 C	8	12	15	185	42	10	400	$3\frac{7}{16}$	61	2	$2\frac{1}{2}$	7	9	6	4	2,400
9 C	9	14	20	165	54	12	800	4	67	2	3	9	0	7	0	3,400
10 C	10	16	25	155	60	14	1,100	$4\frac{1}{2}$	71	$2\frac{1}{2}$	$3\frac{1}{2}$	10	2	7	5	4,700
11 C	11	16	30	155	66	14	1,300	$4\frac{1}{2}$	71	$2\frac{1}{2}$	$3\frac{1}{2}$	10	2	7	5	5,100
12 C	12	20	40	135	84	16	2,500	6	$85\frac{1}{2}$	3	4	13	6	8	9	7,800
14 C	14	20	55	135	96	16	3,500	6	$85\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	13	6	8	9	9,200
16 C	16	24	75	125	108	22	4,000	8	98	4	5	16	2	10	0	14,100
18 C	18	24	100	125	108	24	5,000	8	98	$4\frac{1}{2}$	6	16	2	10	0	15,500

Each Engine is furnished with Wrought Iron Main Shaft, Outboard Pillow Block on Adjustable Sole Plate, Band Wheel, Governor, Governor Belt, Stop Valve, Automatic Sight-Feed Cylinder Lubricator and Connections, Oil Can, Oil Cups, Wrenches and Cylinder Drain Pipes and Valves.

ALL PINS ARE STEEL.

Engine illustrated above has been the Standard of this Company for many years.
It is perhaps better known than any other Engine made.
If it were not perfect there would not be so many of them in service for your inspection.
It is as staple as wheat, cotton or corn.
It is suited to all purposes.

PRICES ON APPLICATION.



AUTOMATIC SIDE CRANK ENGINES.

CLASS D.

SPECIFICATIONS.

Estimate Number.	Dimensions of Cylinder.		H. P. at Given Revolutions per Minute with 40 lbs. Mean Effective Pressure.				Band Wheel.			Main Shaft.		Floor Space Required. Approximate.				Shipping Weight.
	Diam. Inches.	Stroke. Inches.	Indic. Horse Power.	Stand. Revs. pr. Min.	Indic. Horse Power.	Revols. per Minute	Diam. Inches.	Width of Belt. Inches.	Weight Lbs.	Diam. Inches.	Cen. of Eng. to End of Shaft. Inches.	Length Ft.	Length In.	Width. Ft.	Width. In.	Pounds Approximate.
7 D	7	10	17	225	19	250	40	8	1,500	$2\frac{15}{16}$	55	7	0	5	9	3,000
8 D	8	12	24	200	27	225	42	10	2,000	$3\frac{7}{16}$	61	7	9	6	4	4,200
9 D	9	14	32	180	38	215	54	12	2,500	4	67	9	0	7	0	5,300
10 D	10	16	44	175	50	200	60	14	3,000	$4\frac{1}{2}$	71	10	2	7	5	7,000
11 D	11	16	53	175	60	200	66	14	4,000	$4\frac{1}{2}$	71	10	2	7	5	8,200
12 D	12	20	68	150	82	180	84	16	5,000	6	$85\frac{1}{2}$	13	6	8	9	10,900
14 D	14	20	93	150	112	180	96	16	6,000	6	$85\frac{1}{2}$	13	6	8	9	12,300
16 D	16	24	131	135	160	165	108	22	7,000	8	98	16	2	10	0	17,900
18 D	18	24	166	135	203	165	108	24	8,000	8	98	16	2	10	0	19,300

Each Engine is furnished with Wrought Iron Main Shaft, Outboard Pillow Block on Adjustable Sole Plate, Band Wheel, Automatic Shaft Governor, Balanced Slide Valve, Stop Valve, Automatic Sight-Feed Cylinder Lubricator and Connections, Bracket Wipe Oiler for Cross-Head Pin, Centrifugal Ball Oiler for Crank Pin, Drip Oiler for Eccentric, and Special Oilers for Main Bearing, Valve Cross-Head and Main Cross-Head Guide Caps, Oil Can, Wrenches and Cylinder Drain Pipes and Valves.

QUALITY PAYS. GREAT SAVING OF FUEL. PERFECT UNIFORMITY OF SPEED.

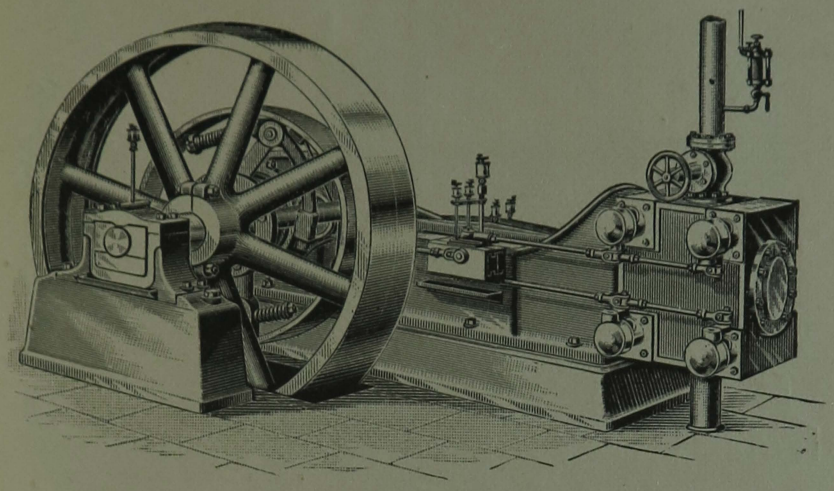
The above picture exhibits our Standard Automatic Engine.

It is the same as the Engine shown on page 5, except its speed is regulated by a Shaft Governor and the Valve is carefully balanced.

The speed regulation of this Engine and its economy in the use of steam are much superior to many Engines of higher sounding claims.

There is no better regulation and if there is any Engine more economical in the use of steam the difference is so little that a number of years savings of fuel will be necessary to account for the difference in first cost.

PRICES ON APPLICATION.



CYCLOIDAL HEAVY DUTY ENGINES.

SINGLE EXPANSION.

SPECIFICATIONS.

Nominal Rated Horse Power	Cylinder.		Standard Revolution per Minute.	Band Wheel As Usually Furnished			Main Shaft.				Floor Space Including Wheel and Out-Board Bearing.				Shipping Weight. Approximate Pounds.
							Diam. bet. Bearings. Inches.	Cent. of Engine to End of Shaft Inches.	Bearings.		Length.		Width.		
	Diam. Inches.	Stroke. Inches		Diam. Inches.	Width of Belt. Inches	Weight Pounds			Diam. Inches	Length Inches.	Ft.	In.	Ft.	In.	
70	11	15	250	60	16	3,000	6½	85	5½	12	10	4	9	1	15,000
85	12	15	250	66	16	3,500	7	85	6	12	10	7	9	1	16,500
100	13	18	225	72	18	4,000	7½	97	6½	14	12	6	10	6	23,000
125	14	18	225	78	18	5,000	8	97	7	14	12	9	10	6	24,500
150	15	21	200	84	24	6,000	8½	108	7½	16	14	0	12	0	32,500
175	16	21	200	90	24	7,000	9	108	8	16	14	3	12	0	34,500
225	18	24	175	96	30	8,000	10	120	9	20	16	6	13	0	45,000
275	20	24	175	108	30	10,000	11	120	10	20	17	0	13	0	47,500
350	22	30	150	120	36	12,000	12	132	11	24	19	3	15	0	64,500
400	24	30	150	144	36	15,000	13	132	12	24	20	3	15	0	68,000

Each Engine is furnished with Hammered Wrought Main Shaft, Outboard Pillow Block with Removable Bearing and Adjustable Sole Plate, Sub Base—for the four smaller sizes—Automatic Shaft Governor with Roller Bearings, Band Wheel, Throttle Valve, Foundation Bolts and Plates, Automatic Sight Feed Cylinder Lubricator and Connections, Centrifugal Ball Oiler for Crank Pin, Standards and Brackets with Stationery Oil Cups for thorough lubrication under continuons running at full speed, Engineer's Oiler Set, Special and Set Screw Wrenches, Cylinder Drain Pipes and Valves.

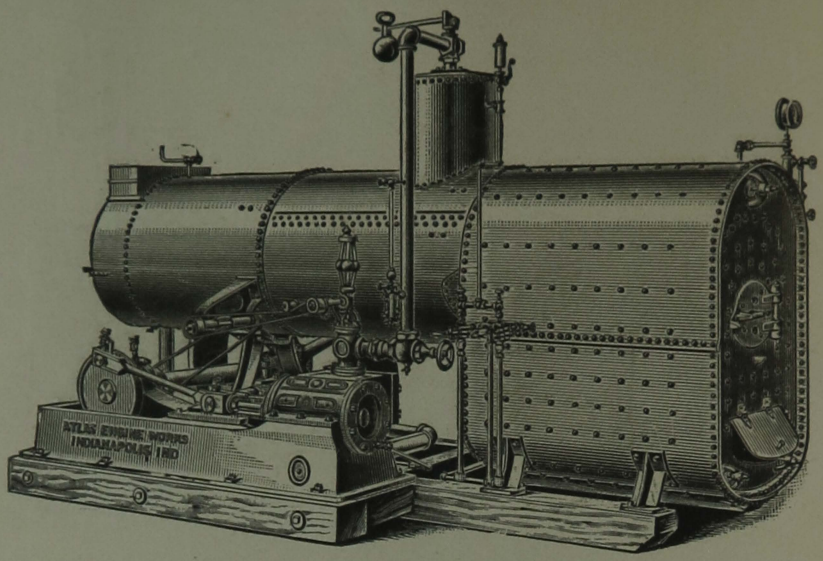
BUILT NOT TO EQUAL, BUT TO SURPASS ALL OTHER HIGH GRADE ENGINES.

To meet the most exacting requirements, this Company offers the Engine illustrated on this page, and directs attention to the features that are special to this Engine only and possessive of extraordinary merit for their duties.

The aim has been at perfection, not to equal, but to surpass in merit all other designs offered to high class trade.

Space does not permit of detailed description, but a Catalogue devoted especially to the Atlas Cycloidal Engine will be sent to you if you ask for it.

PRICES ON APPLICATION.



SEMI-FIXED OUTFITS.

CLASS C R.

SPECIFICATIONS.

ESTIMATE NUMBER.	PLAIN SIDE CRANK ENGINE.				LOCOMOTIVE BOILER.				Shipping Weight.
	Diameter of Cylinder Inches.	Length of Stroke. Inches.	Nominal Rated Horse Power.	Standard Revolutions per Minute.	Diameter of Shell. Inches.	Length Over All. Ft.	In.	Nominal Rated Horse Power.	Pounds Approximate.
7 C R	7	10	10	200	28	9	5	10	4,900
8 C R	8	12	15	185	32	11	0	15	6,800
9 C R	9	14	20	165	34	12	8	20	9,600
10 C R	10	16	25	155	36	14	0	25	12,100
11 C R	11	16	30	155	40	15	2	30	13,400
12 C R	12	20	40	135	42	16	4	40	18,600

Each Outfit includes: ENGINE with Wrought Iron Main Shaft, Outboard Pillow Block on Adjustable Sole Plate, Band Wheel, Governor, Governor Belt, Stop Valve, Automatic Sight Feed Cylinder Lubricator and Connections, Oil Can, Oil Cups, Wrenches and Cylinder Drain Pipes and Valves.

LOCOMOTIVE BOILER, with Dome, Grate Bars, Safety Valve, Steam Gage and Siphon, Glass Water Gage and Gage Cocks, Check Valve, Stop Valve, Blow-Off Cock, Whistle, Smoke Stack and Guy Rods.

Two Injectors with connections to Boiler, Steam Pipe connecting Engine and Boiler, and Exhaust Pipe.

Engine and Boiler fixed on skids, as illustrated above.

The above specifications refer to PLAIN ENGINES. We are prepared to furnish AUTOMATIC SIDE CRANK ENGINES combined with same type of Boilers, in same manner, if desired.

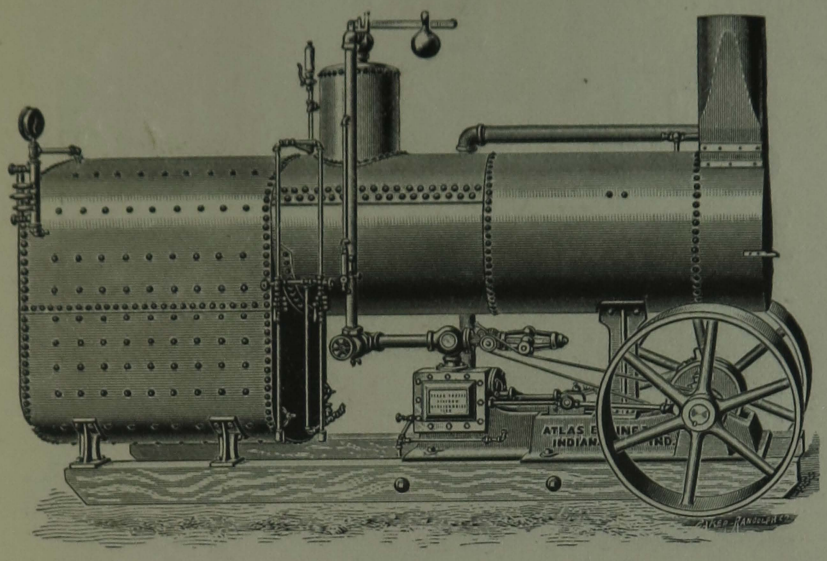
ALL OUR BOILER PLATE IS GUARANTEED BY MAKERS TO TURN DOWN DOUBLE COLD WITHOUT FRACTURE.

So many of the above shown Outfits have been doing daily service so long that it is hardly necessary to praise them.

They are grinding out their own reward in hundreds of places to the entire satisfaction of their owners and to the pleasure of the Company that sent them out on their merits.

It is only fair to ask the people that use them how they like these Outfits.

PRICES ON APPLICATION.



SELF-CONTAINED UNDER OUTFITS, ON SKIDS.

CLASS A R.

SPECIFICATIONS.

ESTIMATE NUMBER.	PLAIN SELF-CONTAINED ENGINE.				LOCOMOTIVE BOILER.				Shipping Weight.
	Diameter of Cylinder Inches.	Length of Stroke. Inches.	Nominal Rated Horse Power.	Standard Revolutions per Minute.	Diameter of Shell. Inches.	Length Over All. Ft.	In.	Nominal Rated Horse Power.	Pounds Approximate.
7 A R	7	10	10	200	28	9	5	10	5,000
8 A R	8	10	15	200	32	11	0	15	6,200
9 A R	9	12	20	185	34	12	8	20	9,400
10 A R	10	12	25	185	36	14	0	25	10,600
11 A R	11	14	30	170	40	15	2	30	12,800
12 A R	12	14	40	170	42	16	4	40	15,100

Each Outfit includes: ENGINE with Wrought Iron Main Shaft, Two Band Wheels, Governor, Governor Belt, Stop Valve, Automatic Sight-Feed Cylinder Lubricator and Connections, Oil Can, Oil Cups, Wrenches and Cylinder Drain Pipes and Valves.

LOCOMOTIVE BOILER on skids, with Dome, Grate Bars, Safety Valve, Steam Gage and Siphon, Glass Water Gage and Gage Cocks, Check Valve, Stop Valve, Blow-off Cock, Whistle, Smoke Stack and Guy Rods.

Two Injectors with connections to Boiler, Steam Pipe Connecting Engine and Boiler, and Exhaust Pipe.

Engine is fixed on the skids under the barrel of the Boiler, as illustrated above.

The above specifications refer to PLAIN ENGINES. We are prepared to furnish AUTOMATIC SELF-CONTAINED ENGINES combined with same type of boilers, in same manner, if desired.

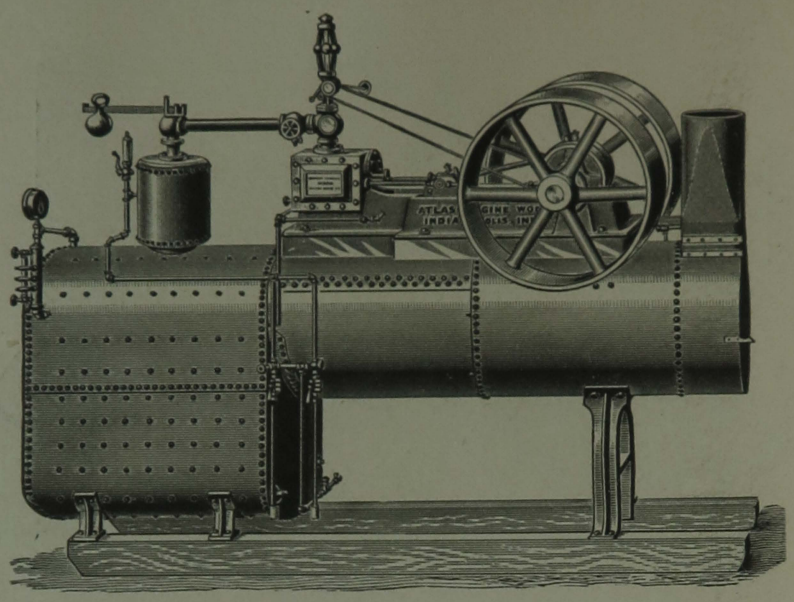
ALL PARTS ARE INTERCHANGEABLE.

Very attractive Outfits are shown on this and the following page. Both are very compact and are well-suited for all service where permanent engine foundations and boiler settings are not desired.

For small Elevators, Saw Mills, Cotton Gins and Tile Mills, they are unequalled.

In some localities competent masons and brick are difficult to procure, and as these Outfits require no foundation, they are specially desirable.

PRICES ON APPLICATION.



SELF-CONTAINED OVER OUTFITS, ON SKIDS.

CLASS A S.

SPECIFICATIONS.

ESTIMATE NUMBER.	PLAIN SELF-CONTAINED ENGINE.				LOCOMOTIVE BOILER.				SHIPPING WEIGHT. Pounds Approximate.
	Diameter of Cylinder. Inches.	Length of Stroke. Inches.	Nominal Rated Horse Power.	Standard Revolutions per Minute.	Diameter of Shell. Inches.	Length Over All. Ft.	In.	Nominal Rated Horse Power.	
7 A S	7	10	10	200	28	9	5	10	5,200
8 A S	8	10	15	200	32	11	0	15	6,400
9 A S	9	12	20	185	34	12	8	20	9,700
10 A S	10	12	25	185	36	14	0	25	10,900
11 A S	11	14	30	170	40	15	2	30	13,200
12 A S	12	14	40	170	42	16	4	40	15,500

Each Outfit includes: ENGINE with Wrought Iron Main Shaft, Two Band Wheels, Governor, Governor Belt, Stop Valve, Automatic Sight-Feed Cylinder Lubricator and Connections, Oil Can, Oil Cups, Wrenches and Cylinder Drain Pipes and Valves.

LOCOMOTIVE BOILER on skids, with Dome, Grate Bars, Safety Valve, Steam Gage and Siphon, Glass Water Gage and Gage Cocks, Check Valve, Stop Valve, Blow-Off Cock, Whistle, Smoke Stack and Guy Rods.

Two Injectors with connections to Boiler, Steam Pipe connecting Engine and Boiler, and Exhaust Pipe.

Engine is fixed on top over the barrel of the Boiler, as illustrated above.

The above specifications refer to PLAIN ENGINES. We are prepared to furnish AUTOMATIC SELF-CONTAINED ENGINES combined with same type of Boilers, in same manner, if desired.

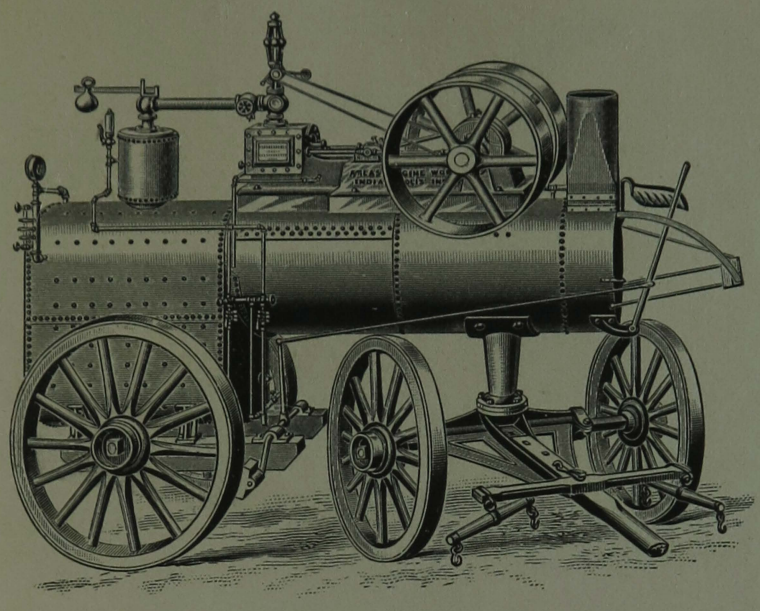
AS STAPLE AS WHEAT, COTTON OR CORN.

On the opposite page general reference has been made to this page also, but before passing, you are urgently requested to look closely at the two Outfits.

The House has special pride in them. What other Outfits of this character compare with them in general liberality of design and generosity in the use of metal?

The truth is that they are well built and constitute the best of their kind ever made by anybody.

PRICES ON APPLICATION.



SELF-CONTAINED OVER OUTFITS, ON WHEELS.

CLASS A U.

SPECIFICATIONS.

ESTIMATE NUMBER.	PLAIN SELF-CONTAINED ENGINE.				LOCOMOTIVE BOILER.				Shipping Weight.
	Diameter of Cylinder Inches.	Length of Stroke. Inches.	Nominal Rated Horse Power.	Standard Revolutions per Minute.	Diameter of Shell. Inches.	Length Over All. Ft.	In.	Nominal Rated Horse Power.	Pounds Approximate.
7 A U	7	10	10	200	28	9	5	10	6,700
8 A U	8	10	15	200	32	11	0	15	8,000
9 A U	9	12	20	185	34	12	8	20	11,500
10 A U	10	12	25	185	36	14	0	25	13,100
11 A U	11	14	30	170	40	15	2	30	15,600
12 A U	12	14	40	170	42	16	4	40	18,100

Each Outfit includes: ENGINE with Wrought Iron Main Shaft, Two Band Wheels, Governor, Governor Belt, Stop Valve, Automatic Sight-Feed Cylinder Lubricator and Connections, Oil Can, Oil Cups, Wrenches and Cylinder Drain Pipes and Valves.

LOCOMOTIVE BOILER on skids with Dome, Grate Cars, Safety Valve, Steam Gage and Siphon, Glass Water Gage and Gage Cocks, Check Valve, Stop Valve, Blow-Off Cock, Whistle, Smoke Stack and Guy Rods.

Two Injectors with connections to Boiler, Steam Pipe connecting Engine and Boiler, and Exhaust Pipe.

Engine is fixed on top, over the barrel of the Boiler, and the entire Outfit is mounted on Wheels, as illustrated above.

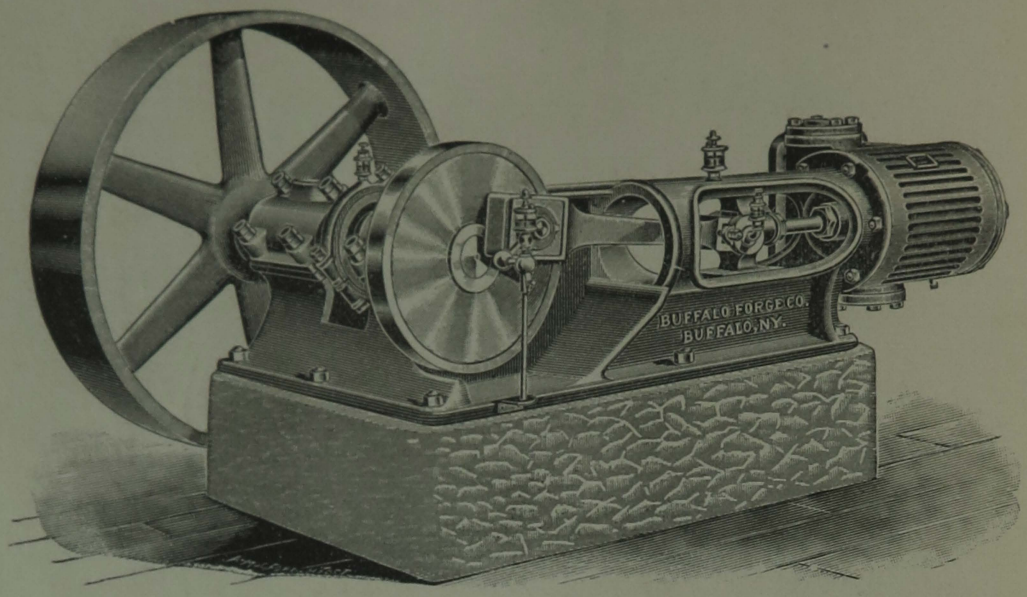
The above specifications refer to PLAIN ENGINES. We are prepared to furnish AUTOMATIC SELF-CONTAINED ENGINES combined with same type of Boilers, in same manner, if desired.

SUITED TO ALL PURPOSES.

Your attention is directed to the two Outfits before you, specially mentioned on the foregoing page. You will notice that in one the Engine is dropped down low on the skids and is fixed on top of the Boiler in the other.

Both have advantages, and as both styles are desirable, the judgment of the buyer must govern as to which is best suited to his needs.

PRICES ON APPLICATION.



BUFFALO HORIZONTAL ENGINES.

WITH SINGLE CYLINDER AND VALVE, SELF-CONTAINED TYPE.

The two forms of the BUFFALO HORIZONTAL ENGINE have been in wide demand for years, for situations where either a plain slide or piston-valve engine with a throttling governor was desirable. The engravings illustrate the design and construction when first brought out. Naturally some few changes have since been embodied where continuous use under trying service has indicated improvement possible.

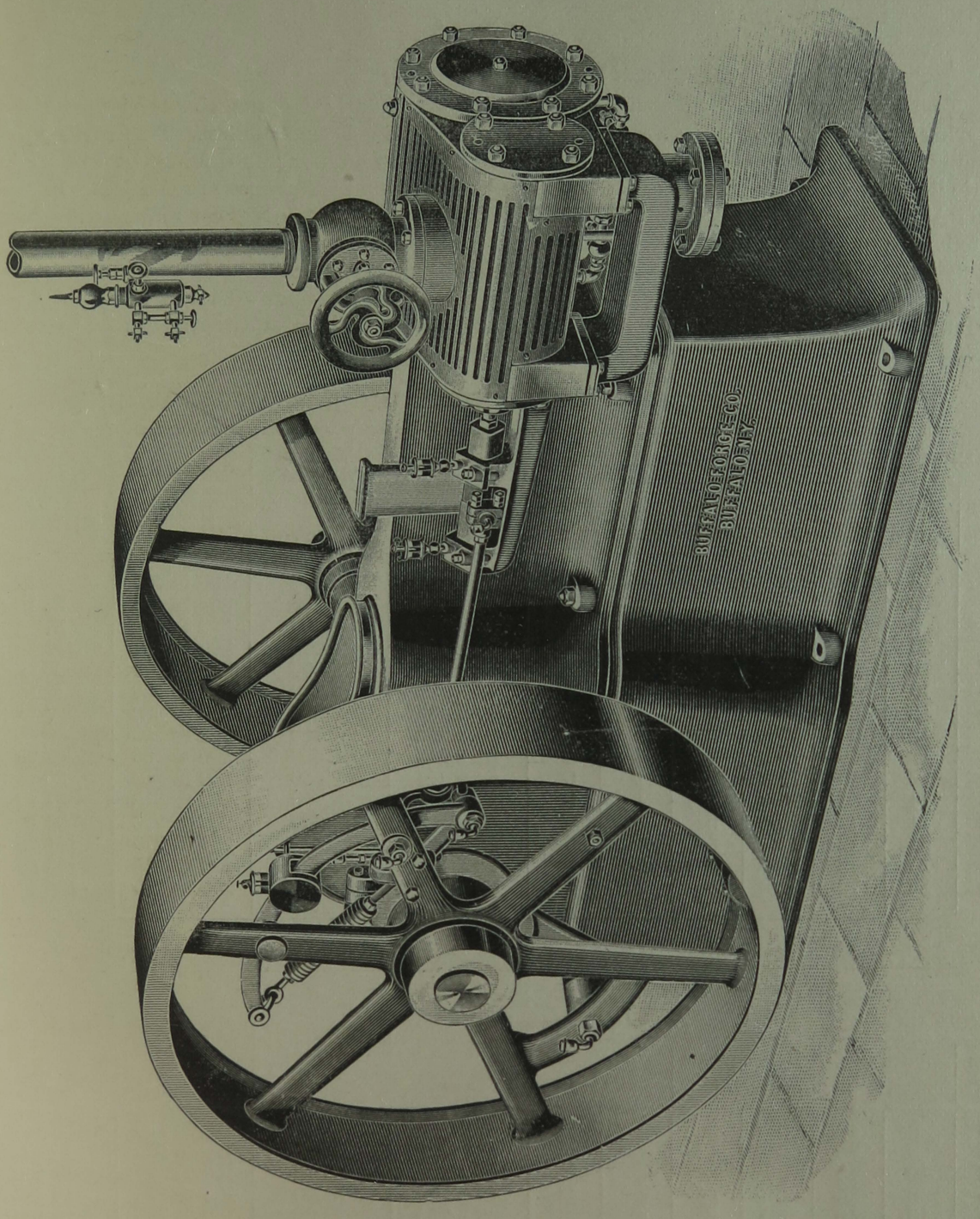
The size 10x10 is the largest built self-contained with overhung wheel, as illustrated by cut. All below this may be furnished in the same style or with outboard bearing, as may be preferred. Both of these designs of engines are especially adapted for comparatively high speeds. All sizes larger than 10x10 of the BUFFALO HORIZONTAL SIMPLE ENGINE are built only with outboard bearing and fly wheel. The construction of both of these types of horizontal engines in the main is identical, the only variation being the details incident to the two forms. Each of these designs has a running record unsurpassed by any similar horizontal engine upon the market, in the important items of steam economy, efficiency, smooth running and durability.

The quality of workmanship and material, and the general efficiency of the BUFFALO HORIZONTAL ENGINES throughout are fully guaranteed.

TABLE OF PRINCIPAL DIMENSIONS.

CYLINDER.		Revolutions per Minute.	Horse Power 80 Lbs. Steam	FLY WHEELS		STEAM PIPE.		CRANK PIN.		SHAFT JOURNAL.		Shipping Weight.	PRICES.
Diam. Inches.	Stroke. Inches.			Diam. Inches.	Face. Inches.	Supply Inches.	Exhaust. Inches.	Diam. Inches.	Length Inches.	Diam. Inches.	Length. Inches.		
5	7	350	10	30	5	1¼	1½	1⅞	2	2¼	40	1400	.....
6½	8	325	17	36	6	1½	2	2	2½	2½	48	1700	.....
8	10	300	30	48	8	2½	3	2	3	3½	54	2100	.....
10	10	275	42	48	8	3	3½	2½	3	3½	54	2400	.....
10	12	250	49	54	10	3	3½	2½	3	4½	66	3400	.....
12	12	250	65	60	12	3½	4	3¼	3¾	5	77	4700	.....
12	14	225	70	60	14	3½	4	3½	3¾	5	77	5000	.....
12	16	200	72	72	14	3½	4	3½	3¾	6	77	6000	.....

PRICES ON APPLICATION.



BUFFALO AUTOMATIC CUT-OFF ENGINES.

HORIZONTAL TYPE ON CAST IRON SUB-BASE.

CLASS "A," CENTER CRANK, WITH SINGLE VALVE.

Front side view, showing governor and steam chest.
Specifications on next page.

BUFFALO AUTOMATIC CUT-OFF ENGINES.

CLASS A.

HORIZONTAL CENTER-CRANK TYPE.

To-day's requirements in steam engineering, particularly for the electrical trade, demand unvarying high rotative speed, short stroke and self-contained construction. This further means a maximum horse-power in a minimum floor space. Economy in dynamo driving, be the service for electric lighting or power purposes, is chiefly dependent upon perfect speed regulation. In this, the Class "A" Buffalo Center-crank Horizontal Engines afford the highest refinement attainable. The following description illustrates the prevailing nicety of treatment of constraction details:

SUB-BASE. Each Class "A" Engine, whether direct coupled to a generator or used separately, is provided with a heavy cast iron base, in form harmonizing with the frame. The usual foundation cap-stone may be dispensed with, as the base affords a substantial finish to the brick coursing of proper height for ample floor clearage of the wheels.

TABLE OF DIMENSIONS AND POWERS, HIGH-PRESSURE ENGINES.

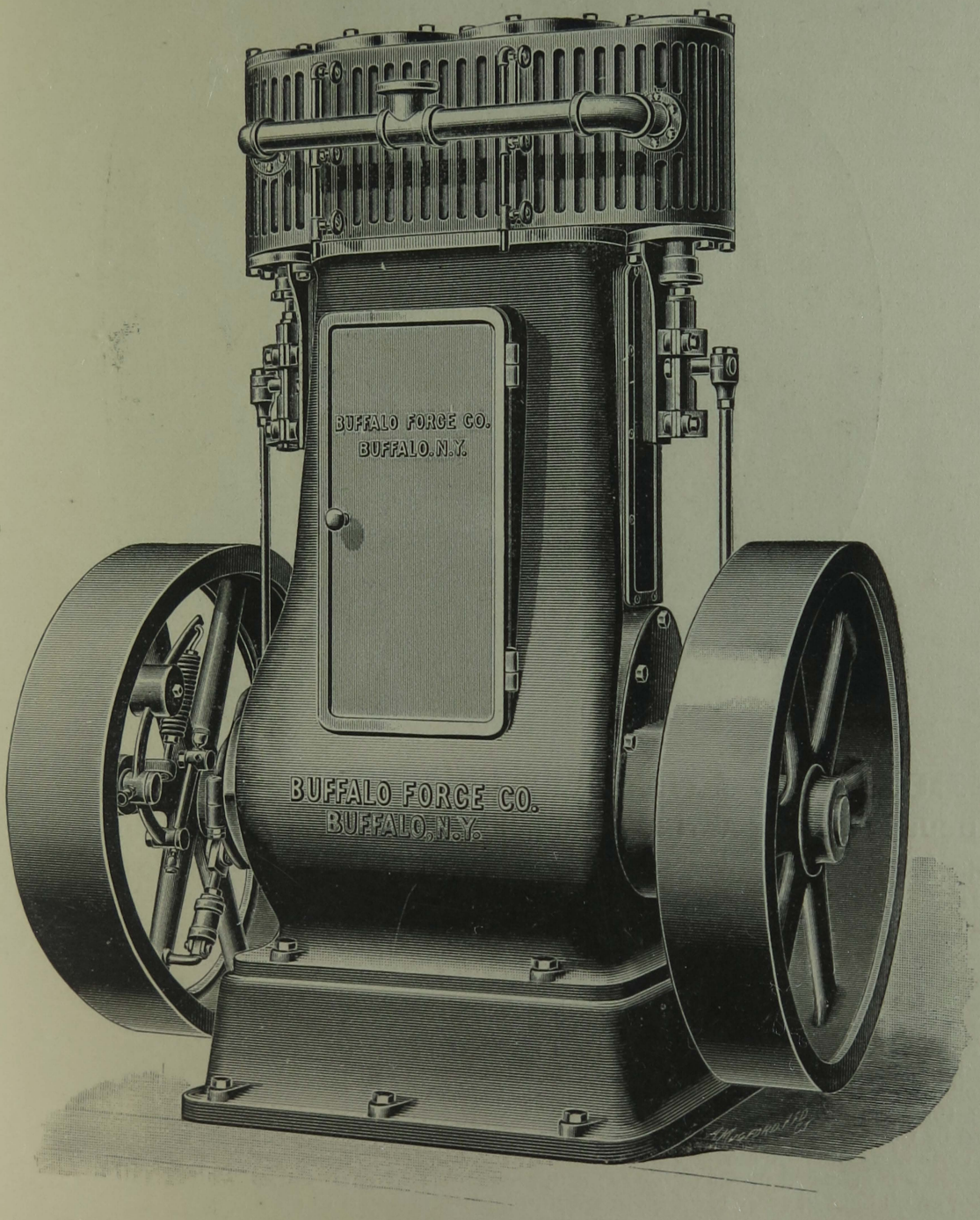
CYLINDER.		FLY WHEELS		PIPES.		Diam. of Shaft. Inches.	Floor Space Required. Inches.	Weight Without Sub-base. Pounds.	Revolutions per Minute.	Horse Power at ¼ Cut-off and 80 Pounds Steam Pressure.
Diam. Inches.	Stroke. Inches.	Diam. Inches.	Face. Inches.	Steam. Inches.	Ex-haust. Inches.					
6	8	40	6½	2	2½	3½	38 x 62	3,000	350 to 400	16 to 19
7	8	40	6½	2	2½	3½	38 x 62	3,200	350 to 400	22 to 25
8	8	40	8½	2½	3	3½	38 x 62	4,000	300 to 350	24 to 29
8	10	48	8½	2½	3	4½	42 x 100	4,900	300 to 350	31 to 35
9	10	48	9½	3	3½	4½	48 x 100	6,000	300 to 350	38 to 45
10	10	48	9½	3	3½	4½	48 x 100	6,200	300 to 350	48 to 56
10	12	54	10½	3	3½	5	54 x 114	7,000	250 to 300	49 to 58
11	12	54	10½	3½	4	5	54 x 114	7,700	250 to 300	58 to 69
12	12	60	10½	3½	4	5	54 x 114	8,500	250 to 300	69 to 80
13	12	60	10½	3½	4	5	54 x 114	8,600	250 to 300	80 to 100
12	14	60	10½	3½	4	6	54 x 114	8,900	250 to 275	81 to 90
13	14	72	12½	5	6	6	60 x 133	13,600	250 to 275	95 to 110
14	14	72	12½	5	6	6½	60 x 133	15,000	250 to 275	111 to 122
14	15	72	12½	5	6	6½	60 x 133	15,200	250 to 275	119 to 130
15	15	72	12½	6	7	6½	60 x 133	20,000	250 to 275	135 to 154

TABLE OF DIMENSIONS AND POWERS, LOW-PRESSURE ENGINES.

CYLINDER.		FLY WHEELS		PIPES.		Diam. of Shaft. Inches.	Floor Space Required. Inches.	Weight Without Sub-base. Pounds.	Revolutions per Minute.	Horse Power at 20 Pounds Steam Pressure.
Diam. Inches.	Stroke. Inches.	Diam. Inches.	Face. Inches.	Steam. Inches	Ex-haust. Inches.					
10	8	40	8½	3	3½	3½	38 x 62	4,000	175 to 250	9 to 13
12	8	40	9½	3½	4	4½	48 x 100	4,200	175 to 250	14 to 19
12	10	48	9½	3½	4	4½	48 x 100	6,350	150 to 225	14 to 22
15	8	48	9½	3½	4	4½	48 x 100	6,550	150 to 225	19 to 29
15	10	48	9½	3½	4	4½	48 x 100	7,000	150 to 225	24 to 36

Before leaving the works, each engine governor will be adjusted to maintain a constant speed at any stated number of revolutions per minute between the minimum and maximum above. If a desired belt velocity is given, the speed will be suited to it with the diameter of pulleys listed for the respective engines. Under a special agreement with purchasers, their engines may be equipped with different sizes of fly wheels than above given, and they are requested to specify with order the desired speed. All horizontal engines are regularly furnished to run over, *i. e.*, the top of fly-wheel pulleys moves away from cylinder. For electrical work, state system (arc or incandescent), name of dynamo, manufacturer and capacity. For direct connection, an arrangement for the usual special sub-base must be made, and detailed drawings of the generator supplied.

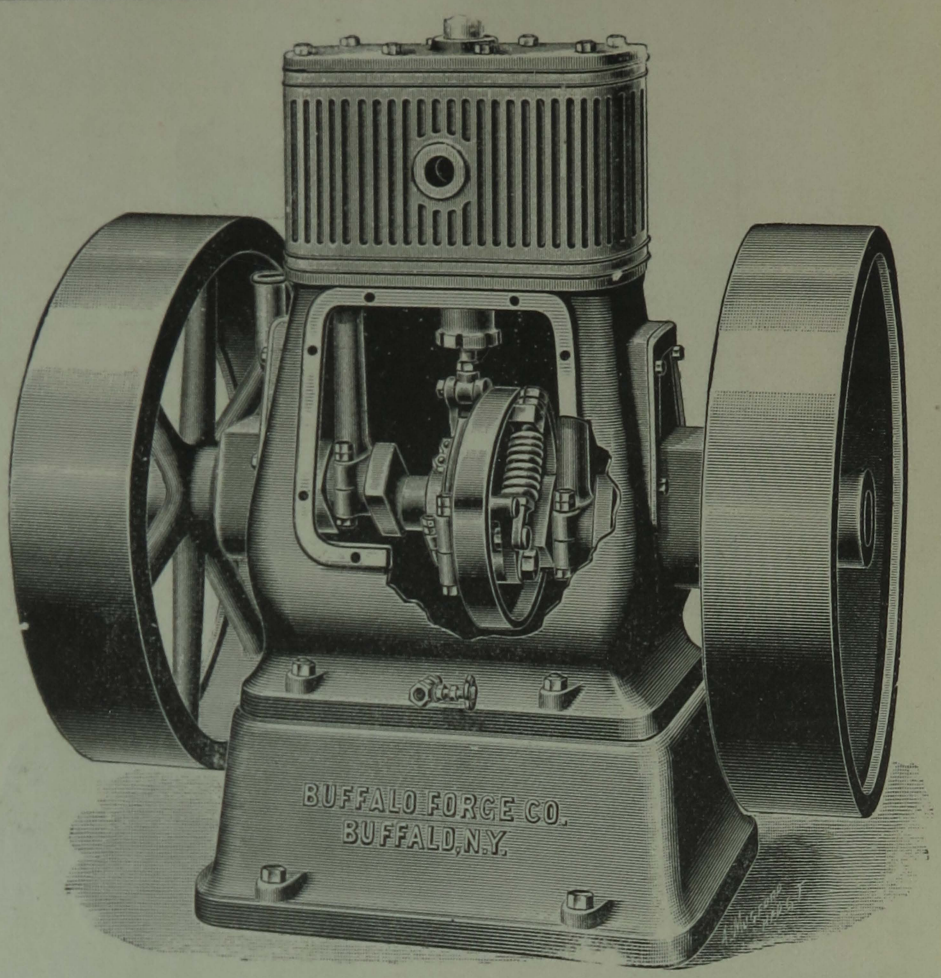
LOW-PRESSURE ENGINES may be furnished with automatic governors which will regulate perfectly at ordinary speeds, or where preferred, with approved forms of throttling governors.



BUFFALO AUTOMATIC CUT-OFF ENGINES.

DOUBLE UPRIGHT TYPE ON CAST IRON SUB-BASE.

Enclosed reciprocating parts running in oil. Built simple and compound.



BUFFALO AUTOMATIC CUT-OFF ENGINES.

DOUBLE SINGLE-ACTING UPRIGHT TYPE ON CAST-IRON SUB-BASE.

View with Frame Broken Away, Showing Enclosed Reciprocating Parts (Including Governor) Running in Oil.

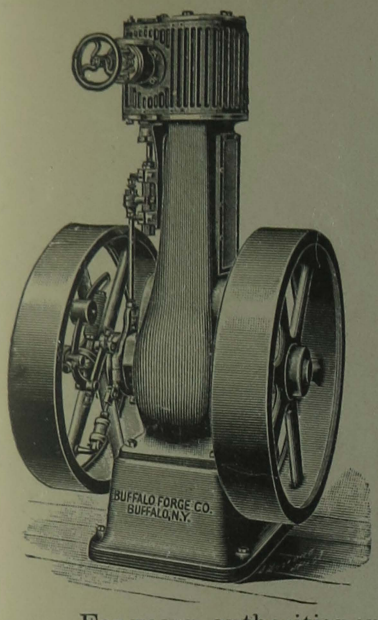
This engine, of which the cut on page 15 is a most excellent illustration, was originally designed for the United States Marine Service. The work thereof necessitated unusually high speed, continuous operation with minimum attention, and the highest nicety of speed government. These requirements have been admirably met, and the engine is at once eminently fitted for electrical work, either for direct or belt connection to generators.

As will be seen, the entire working parts of the engine, including governor, are completely enclosed and run in oil. This prime feature affords positive and ample oiling of all reciprocating parts. It is well-known that engines of corresponding small sizes heretofore have been sadly deficient in this regard; therefore, are short-lived at sustained high speeds. Ready access to the working parts is afforded by the large oil-tight doors, both back and front. This type has two single-acting cylinders placed close together. Steam is admitted only at the top end of the piston on the downward stroke. The governor is attached direct to the crank disc, instead of being introduced in the fly wheel, and receiving an oil bath at every revolution, is thoroughly lubricated at all times.

TABLE OF DIMENSIONS AND POWERS.

CYLINDERS.		PIPES.		FLY WHEELS		SHAFT.	HEIGHT.			FLOOR SPACE REQUIR'D	Revolutions per Minute.	Horse Power 80 lbs. Steam Pressure.	Weight without Sub-Base.
Diam. Inches.	Stroke. Inches.	Steam. Inches.	Exh. Inches.	Diam. Inches.	Face. Inches.	Diam. Inches.	Sub-Base. Inches.	To Cen. Shaft. Inches.	Total	Inches.			
3	3	1	1¼	24	5½	2	9	15	29	24x23	300 to 500	1.3 to 2	300
4	4	1¼	1½	30	6½	2½	10	18	37	30x36⅝	300 to 500	3 to 5.5	500
5	5	1½	2	30	6½	3	12	18	45⅜	30x36¾	250 to 400	5 to 8	1000
6	6	2	2½	36	8½	3	14	21	52¼	36x43½	250 to 400	8.6 to 13.8	1200

PRICES ON APPLICATION.



BUFFALO AUTOMATIC CUT-OFF ENGINES.

SINGLE UPRIGHT TYPE ON CAST-IRON SUB-BASE.

CLASS "A," ENCLOSED CYLINDER, RUNNING IN OIL. BUILT FOR HIGH AND LOW PRESSURES.

View Showing Governor and Removable Side Plate.

For years, authorities on steam engine practice have recognized the value of high-speed horizontal engines running in oil. The BUFFALO is the first upright to adopt this self-oiling feature, and it is equally as valuable as in the horizontal. Several patents have been obtained, covering the application and arrangement of self-oiling parts. Two large oil-tight side plates or doors afford ready access to the interior parts. Repairs, therefore, may be made with the utmost ease under adverse circumstances. The crank shafts may be readily removed without displacing the engine. The steam chests are thoroughly lagged to reduce condensation to a minimum. Each upright is furnished with two unusually heavy wheels. The rocker arm of antiquity and its substitutes have been studiously avoided in this design. The governor, valve, crosshead, and all parts except the frame, are identically the same design and high-grade construction as employed upon the automatic cut-off horizontals. The oiling features of this engine are so regulated that the lubrication is equally thorough at a minimum or maximum speed. Forged steel shafts are used exclusively.

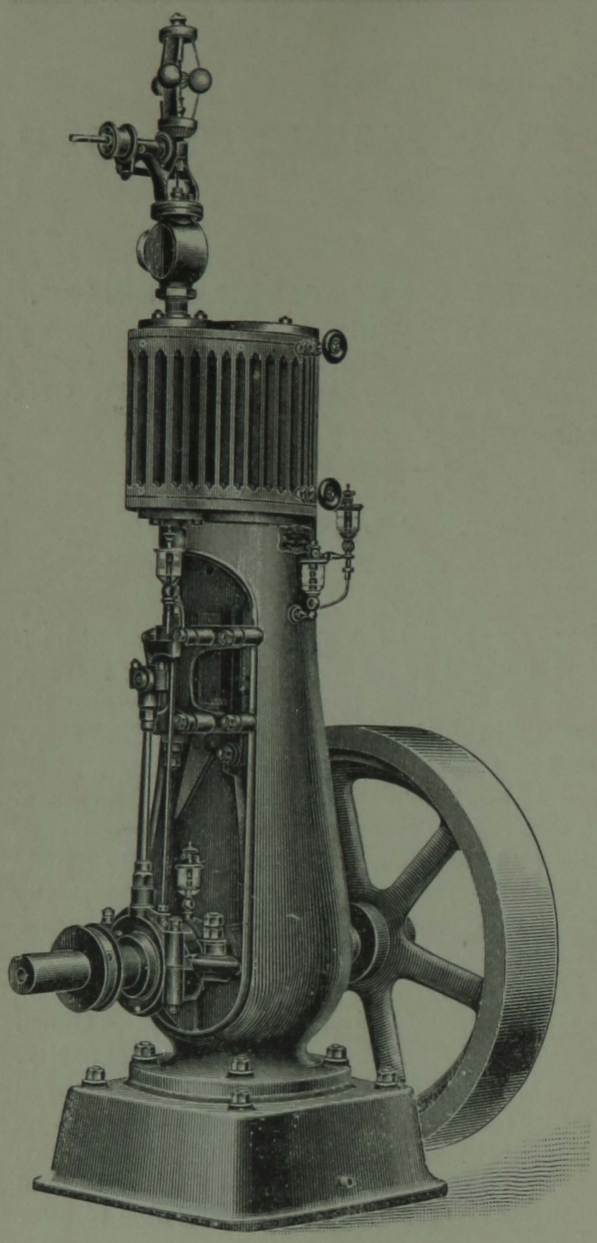
This engine may be furnished in two classes: Class "A," enclosed and running in oil, as shown by cut, and Class "B," outfitted with the usual complement of sight-feed oilers of large capacity. Each engine is supplied with a full set of finished malleable iron wrenches, a throttle valve of approved make and anchor bolts. The BUFFALO AUTOMATIC UPRIGHT ENGINE has marked advantages in its favor. Floor space is reduced to a minimum, and the comparatively short stroke affords low height. For direct-connected generator service, these engines possess unique adaptability and merit not found elsewhere. Constant co-operation with dynamo manufacturers has resulted in our being able to offer the most valuable single or double upright engines obtainable.

LOW-PRESSURE UPRIGHT ENGINES. Observe that the last four sizes in the table given below (indicated by *) are designed for low-pressure steam, and with special reference for heating and ventilating plants in schools, churches, etc.

TABLE OF DIMENSIONS AND POWERS.

CYLINDER.		PIPES.		FLY WHEELS		SHAFT. Diam. Ins	HEIGHT.			FLOOR SPACE REQUIRED.	Revolutions per Minute.	Horse Power	Weight without Base.
Diam. Inches.	Stroke. Inches.	Steam. Inches.	Exh. Inches.	Diam Inches.	Face. Inches.		Sub-Base. Inches.	To Cen. Shaft. Inches.	Total	Inches.			
4	4	1¼	1½	30	5	2½	9	18	48	30 x 30	400 to 550	4.1 to 5.5	1000
5	5	1½	2	30	6	3	9½	18	55	30 x 30	350 to 500	7 to 10	1200
6	6	2	2½	36	6	3	10	21	63	36 x 36	300 to 400	10 to 13.8	1400
6	7	2	2½	36	6	3	10	21	63	36 x 36	300 to 400	12 to 16	1600
8	8	2½	3	40	6	3½	11½	23	74	37¼ x 40	250 to 350	20 to 29	2300
10	10	3	3½	48	10	4½	15½	28	85	44 x 48	200 to 300	32.4 to 48.6	4000
10	12	3	3½	48	10	4½	15½	28	87½	44 x 48	200 to 300	38.9 to 58.4	4000
*12	8	3	3½	48	10	4½	16½	28	80	42¼ x 48	200 to 300	14 to 23	4000
*13	8	3½	4	48	10	4½	16½	28	82	42¼ x 48	200 to 300	17 to 25	4000
*15	8	3½	4	48	10	4½	16½	28	82	42¼ x 48	200 to 300	25 to 30	4000
*15	10	3½	4	48	10	4½	16½	28	84	44 x 48	200 to 300	27 to 43	5000

PRICES ON APPLICATION.



VERTICAL CENTER CRANK ENGINES.

CLASS I. NOS. 1 TO 15.

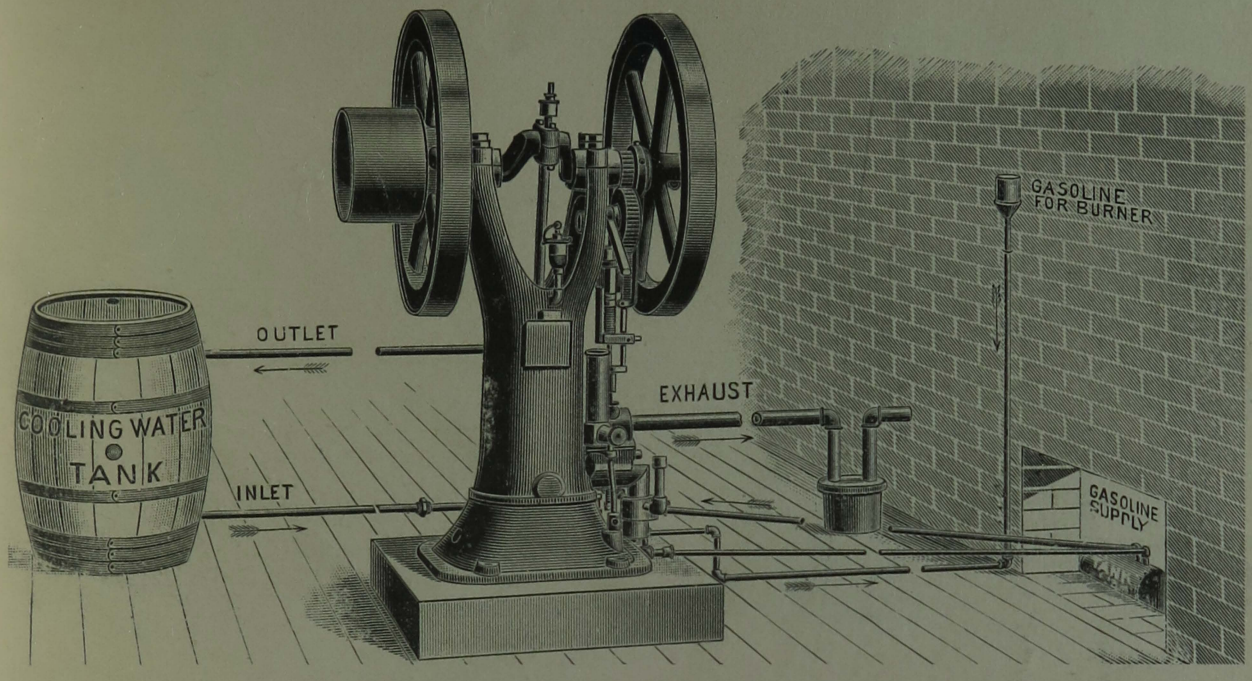
Engine Self-Contained, Complete with Fly Wheel, Cast Iron Base and Throttling Governor.

These engines have solid forged crank shaft, loose shaft boxes, adjustable cross head shoes, automatic cylinder lubricator, automatic adjustable oilers throughout, finished governor, governor belt and full set of wrenches. The valve is set with aid of indicator, and each engine fully tested, under load, before leaving the shop.

NUMBERS AND DIMENSIONS.

Number	1	2	3	4	5	6	7	8	9	10	11	12
Diameter Cylinder....inches	3	3½	4	5	5½	6½	7	8	9	9	10	10
Stroke of Piston.... "	5	5	6	6	7	7	9	9	9	10	10	12
Diameter Shaft.... "	1¾	1¾	2	2	2¾	2¾	3	3	3½	3½	3½	4
Diameter Wheel.... "	20	20	24	24	32	32	42	42	42	48	48	54
Face of Wheel.... "	3	4	4	5	4½	6	7	9	9	9	12	10
Revolutions per minute....	250	250	200	200	180	180	160	160	160	160	160	150
Net H. P. with 60 lbs. steam....	1.8	2.0	3.4	4.7	5.0	8.3	10.5	13.5	15.5	19.0	23.0	27.0
Net H. P. with 70 lbs. steam....	1.9	2.5	3.8	5.5	5.8	9.5	12.0	15.0	19.0	22.0	28.0	32.0
Net H. P. with 80 lbs. steam....	2.2	3.2	4.3	6.4	6.6	10.7	13.5	16.5	22.5	25.0	33.0	38.0
Size of Steam Pipe ....inches	¾	¾	1	1	1¼	1¼	1½	1½	2	2	2½	2½
Size of Exhaust Pipe.... "	1	1	1¼	1¼	1½	1½	2	2	2½	2½	3	3
Floor to Top of Cylinder.... "	41¾	41¾	51⅜	51⅜	61¾	60¾	77¾	77¾	77¾	87⅝	87⅝	101
Center of Shaft to Floor.... "	11	11	13¾	13¾	17	17	25	25	25	26	26	29
Size of Base Square.... "	15	15	18	18	23	23	26	26	26	28	28	32
Floor Space over Shaft .... "	24	24	32	32	36	37	46	47	47	52½	58	57
Floor Space over Wheel.... "	20	20	24	24	32	32	42	42	42	48	48	54
Weight of Wheel.... ....pounds	85	110	165	200	350	425	560	680	720	750	900	1000
Weight Complete.... "	363	381	562	585	870	946	1873	1935	2000	2450	2650	3800
Shipping Weight, about .... "	421	479	720	743	1105	1241	2063	2320	2400	2835	3035	4200

PRICES ON APPLICATION.



SHOWING CONNECTION OF WEBSTER ENGINE.

WEBSTER UPRIGHT GAS AND VAPOR ENGINE.

No. 2.

WHAT THIS ENGINE WILL DO.

It will elevate 800 bushels of grain per hour a height of 50 feet; or, in other words, it will run one elevator leg of 8x5 inch buckets, carrying 800 bushels per hour, a height of 50 feet. It will grind ten bushels per hour of corn and oats. It will pump 3000 gallons of water per hour, lifting it 40 feet and putting it up to a height of 60 feet. *It will run a cylinder press and two or three small presses.* It will run a large ice cream freezer or several small ones.

PRICE AND TERMS OF SALE.

Though we are building an engine of first quality, both as to materials and workmanship, we have decided that many thousand can be put on the market if a popular price can be reached. We therefore offer this engine at $150.00, F. O. B. Chicago, complete with outfit as shown on page 19. We believe at this price no one needing a small power can afford to be without it.

We offer a special discount for cash with order or cash against bill-lading.

To persons desiring to purchase this engine on time we would make the following terms: One-third cash with order, and the balance on such terms as might be agreed upon, with security.

COST OF RUNNING.

This engine will run on about a gallon of gasoline per indicated H. P., or from 20 to 30 cents per day of ten hours.

A COMPLETE OUTFIT.

We send with each Gas Engine as a complete outfit the following:

One set of Foundation Bolts, which will consist of four ⅝x15 inch Bolts.

One Engine complete with Oil Cups.

One Bunsen Burner and Tank. One Exhaust Box and Pipe leading into it.

One 5-gallon Gasoline Tank, together with such small Pipe as is necessary to connect up to a distance of 10 feet.

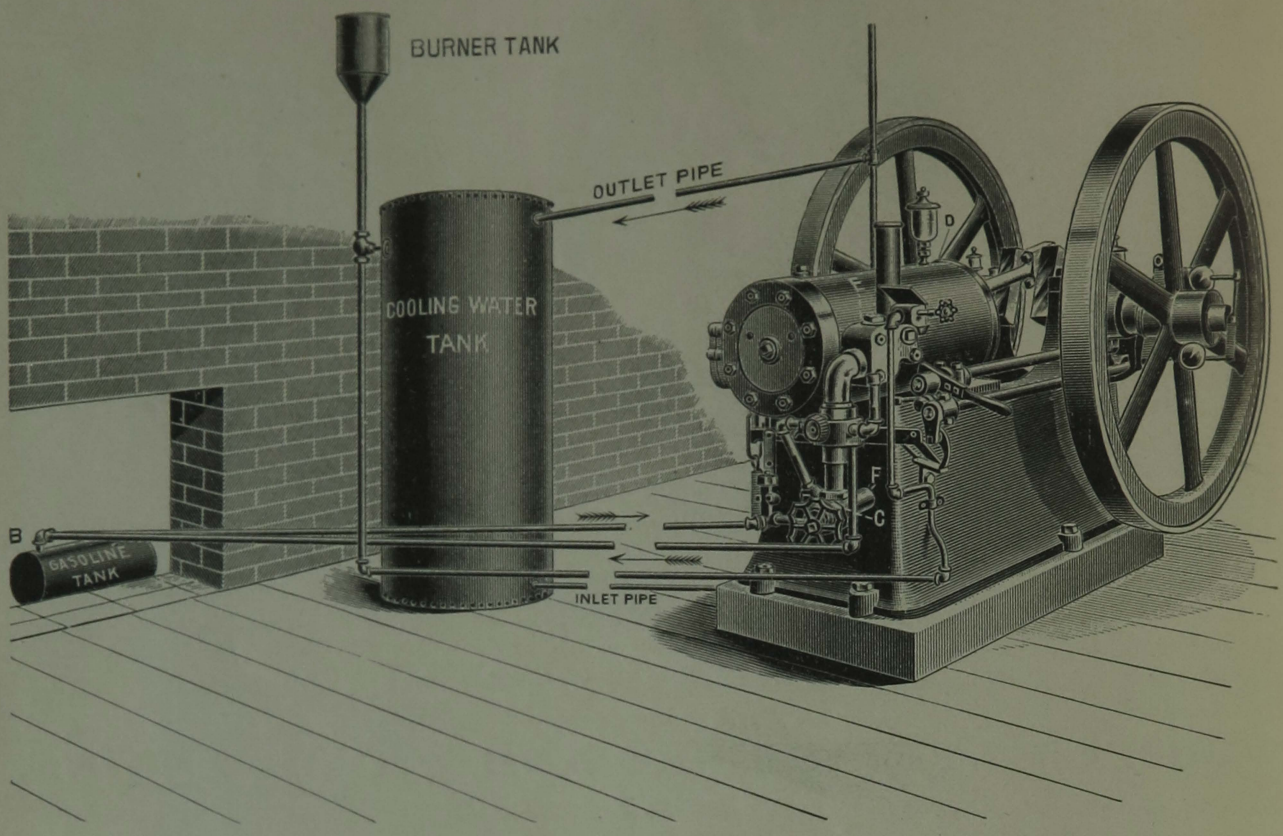
All Pipes needed to connect Engine with Water Tank a distance of not over 10 feet.

One Driving Pulley 9x6 inches. One 8-inch Monkey Wrench. One Alligator Wrench.

One Squirt Oil Can.

Boxed and ready for delivery on cars.

If *Water Tank* is required, will furnish water tank made of galvanized iron, of 100 gallons capacity, for $7.00 net; but often the user can utilize his gasoline barrel for this purpose.



IMPROVED WEBSTER GAS AND VAPOR ENGINES.

Patented May 5, 1891. December 26, 1893. Other patents pending.

OPERATION OF ENGINE.

Referring to the figures in the cut, the operation of the Engine is as follows:

A represents the evaporator cylinder, into which the gasoline is pumped from a supply tank, *B*, placed on the outside of building. Two small pipes are connected with this tank; the upper one is the pipe through which the gasoline is pumped to the evaporator. The other is the overflow pipe which returns all surplus gasoline to supply tank, by every alternate stroke of the Engine. Whatever more is put into the evaporator than is required (viz., about half an inch), at once passes back through the overflow pipe into the gasoline supply tank. This fact is a very important one in the matter of insurance, as we do not depend upon gravity for our supply of gasoline, but only pump into the receptacle what is required, which is a very small amount, say about half an inch in the reservoir at one time.

C represents the burner, which is connected by a small pipe with a receptacle holding about half a gallon of gasoline, and is used to heat the ignition tube, which is screwed into top of inlet valve chest, *D*, and into which the gas enters and is ignited. If the use of gasoline for heating the tube is objectionable, we can, for a stated sum, furnish a battery and electric spark, doing away altogether with gasoline for this purpose.

A tank holding two or three barrels of water, depending on the size of the Engine, is placed in any convenient position. This water is circulated around the cylinder of the Engine to keep the cylinder cool. The same water is used over and over again, several barrels lasting a long time, as the only loss is by evaporation.

Improved Webster Gas and Vapor Engines--Continued.

In operation the cold air is sucked through pipe *E*, and passes over the gasoline in the bottom of evaporator Cylinder *A*. The proper mixture for the charge is thus made. The valve admitting the mixture of gas into the cylinder is controlled by the governor; when the load is light and the Engine attempts to run beyond its regulated speed, the governor catches hold of the inlet valve and allows only a small charge to enter; should the Engine, on account of a heavy load, have a tendency to slow down, the governor again catches the inlet valve and opens it wide, allowing a large charge. In this way we get a charge every other revolution, and produce an almost absolutely steady motion with great economy, as the amount of gas used depends entirely upon the work it has to do.

A COMPLETE OUTFIT.

We send with each Gas Engine, as a complete outfit, the following, which is all required to set it on its foundation, viz.:

One Engine complete, with Oil Cups.

One Bunsen Burner and Tank.

One Exhaust Box and Pipes leading into it.

One Water Tank for holding water for Cooling Cylinder, varying according to the size of Engine sent.

One Gasoline Tank, size depending on size of Engine, together with such small pipes as will connect it, say for a distance of not more than 20 feet.

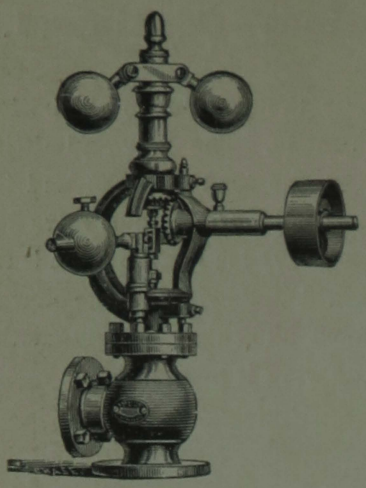
All Pipes needed to connect Engine with Water Tank, to a distance of not over 15 feet.

One Driving Pulley. One Hand Crank. One 8-inch Monkey Wrench. One "S" Wrench. One Alligator Wrench. One Squirt Oil Can.

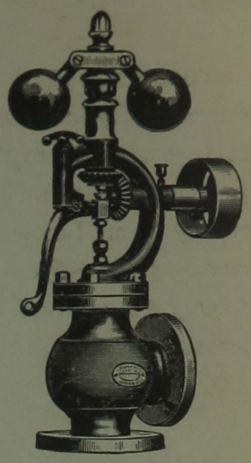
Boxed, packed and ready for delivery on board cars.

PRICE LIST.

Number.	Actual Horse P.	Indicated Horse P.	SIZE OF PULLEY.		Width of Belt. Inch.	Revolut. per Minute	FLOOR SPACE.		Shipping Weight.	PRICE.	FOUNDATION BOLTS.		
			Diam.	Face.			Length.	Width.			No.	Dia.	Length.
3	3	4	10 x 6	inch.	3	300	5 ft. 0 in.	x 3 ft. 5 in.	2,020 lbs	$ 450 00	6	5/8	3 ft. 8¼ in.
5	5	7.3	18 x 10	"	5	280	5 " 6 "	x 4 " 3 "	3,100 "	600 00	6	¾	4 " 3¾ "
7½	7½	11.2	20 x 11	"	5½	270	6 " 6 "	x 4 " 2 "	3,900 "	850 00	6	⅞	5 " 6 "
12	12	16	24 x 12	"	6	240	7 " 3 "	x 5 " 0 "	5,500 "	1,150 00	6	⅞	5 " 9 "
17	17	23	36 x 14	"	7	230	7 " 10 "	x 5 " 10 "	7,850 "	1,400 00	6	1	6 " 0 "



Class "A," with Automatic Safety Stop and Speeder.



Class "B," with Speeder and Sawyer's Lever.

THE GARDNER STANDARD GOVERNORS.

PRICE LIST AND TABLE OF DIMENSIONS OF CLASS "A" STANDARD GOVERNORS.

In ordering, state whether Plain or Finished is desired.

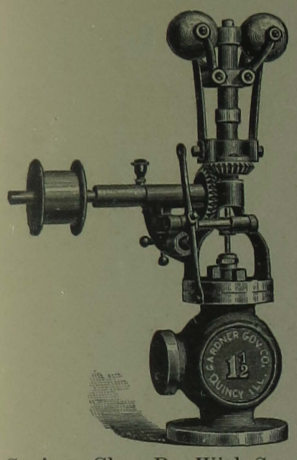
SIZE OF GOVERNORS. Diameter of Openings.	1½	2	2¼	2½	3	3½	4	4½	5	6	7	8
Class "A" Plain....	$29 50	36 00	42 00	48 00	59 00	71 00	83 00	96 00	109 00	140 00	170 00	210 00
Class "A" Finished.	33 50	40 00	47 00	53 00	67 00	80 00	93 00	107 00	121 00	154 00	186 00	227 00

PRICE LIST OF STANDARD GOVERNORS—CLASS "B."

In ordering, state whether Plain or Finished is desired.

SIZE OF GOVERNORS. Diam. of Open.	¾	1	1¼	1½	2	2¼	2½	3	3½	4	4½	5	6	7	8
Class "B," Plain.....	$ 18 00	20 00	22 00	25 00	30 00	35 00	40 00	50 00	60 00	71 00	83 00	94 00	122 00	150 00	185 00
Class "B," Finished...	20 00	22 00	25 00	29 00	34 00	40 00	45 00	58 00	69 00	81 00	94 00	106 00	136 00	166 00	202 00

Class "B" is without Automatic Stop and Class "A" with Automatic Stop.



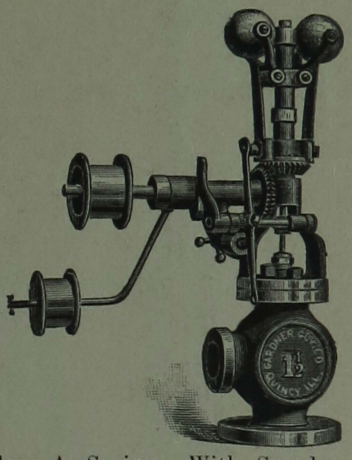
Spring—Class B. With Speeder and Hand Lever.

GARDNER SPRING GOVERNORS.

Our Spring Governors are designed especially for high-speed stationary and portable engines. They are very quick and sensitive in action. In construction they are fully up to the best modern practice in every particular, and are made in sizes from one-half to seven inches inclusive.

Class B represents our Spring Governor without Automatic Stop, but furnished with speeder and hand lever on all sides.

Class A shows the Spring Governor with Automatic Stop. This also has speeder and hand lever.



Class A—Spring. With Speeder, Hand Lever and Automatic Stop.

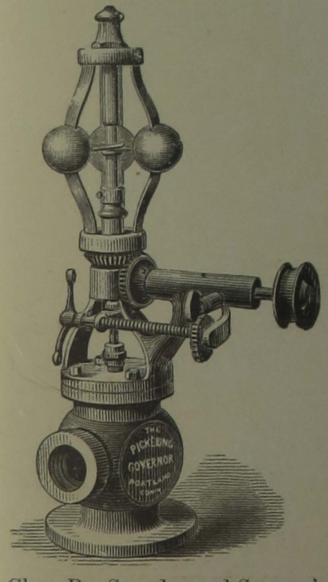
PRICE LIST OF CLASS "A" AND "B" SPRING GOVENORS.

	SIZE AND PRICE OF GOVERNORS—DIAMETER OF OPENINGS.														
	½	¾	1	1¼	1½	2	2¼	2½	3	3½	4	4½	5	6	7
Class B, Plain	$16 00	$18 00	$20 00	$22 00	$25 00	$30 00	$35 00	$40 00	$50 00	$60 00	$71 00	$ 83 00	$ 94 00	$122 00	$150 00
Class B, Finished	18 00	20 00	22 00	25 00	29 00	34 00	40 00	45 00	58 00	69 00	81 00	94 00	106 00	136 00	166 00
Class A, Plain	.....	.....	23 00	25 50	29 50	36 00	42 00	48 00	59 00	71 00	83 00	96 00	109 00	140 00	170 00
Class A, Finished	.....	.....	25 00	28 50	33 50	40 00	47 00	53 00	67 00	80 00	93 00	107 00	121 00	154 00	186 00

(Class B is without Automatic Stop and Class A with Automatic Stop.)

TABLE OF DIMENSIONS OF CLASS "A" AND "B" SPRING GOVERNORS.

	SIZE OF GOVERNORS.														
	½	¾	1	1¼	1½	2	2¼	2½	3	3½	4	4½	5	6	7
Diameter of Base Flange	Sc'd	Sc'd	Sc'd	Sc'd	5½	7	7	8	9	9	10	10	12	14	15
Diameter of Side Flange	Sc'd	Sc'd	Sc'd	Sc'd	Sc'd	Sc'd	7	7	8	9	10	10	11	13	14
Height, inches	12	13	13½	17½	22	23	24	27	29	30	35	36	37	42	44
Radius of Balls	2½	2½	2½	3½	4	4	4	5	5	5	5½	6	6	... ..	.....
Length of Shaft	8	8	8	11	11	13	13	15	15	15	16	16	18	20	20
Diameter of Pulleys	1½	1½	1½	2	2½	2½	2½	3½	3½	3½	4½	4½	4½	6	6
Width of Belt	1	1	1	1¼	1½	1½	1½	2	2	2	2½	2½	2½	2	3
Center to Side of Chamber	1¾	2¼	2½	3	3½	5	5	5½	6	6½	6½	7	7½	8¼	9
Base to Center of Chamber	1¾	2¼	2½	3	4	5	5½	5½	6	6½	6½	7	8	8¼	9½
Number of Revolutions	600	600	600	450	400	400	400	350	350	350	275	275	275	280	280

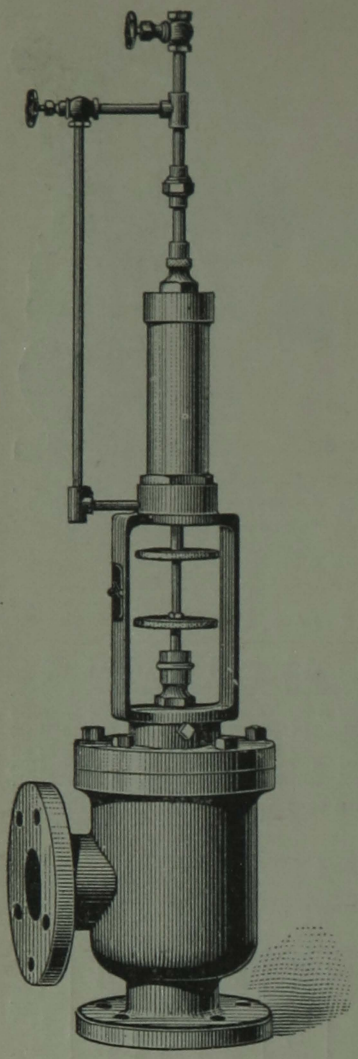


Class B.—Speeder and Sawyer's Lever.

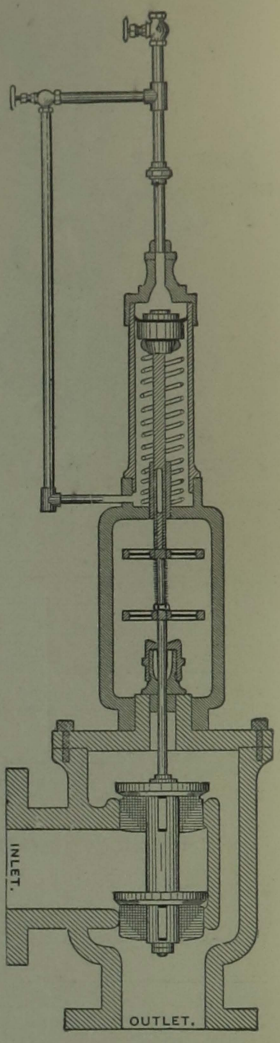
PICKERING'S GOVERNORS.

SIZE OF GOVERNORS. DIAM. OF OPENINGS	½	¾	1	1¼	1½	2	2¼	2½
Price Class B, Plain	$16 00	$18 00	$20 00	$22 00	$25 00	$30 00	$35 00	$40 00
Price Class B, Finished	18 00	20 00	22 00	25 00	29 00	34 00	40 00	45 00

SIZE OF GOVERNORS. DIAM. OF OPENINGS	3	3½	4	4½	5	6	7
Price Class B, Plain	$50 00	$60 00	$71 00	$83 00	$ 94 00	$122 00	$150 00
Price Class B, Finished	58 00	69 00	81 00	94 00	106 00	136 00	166 00



FISHER PATENT STEAM PUMP GOVERNORS.



CLAIMS.

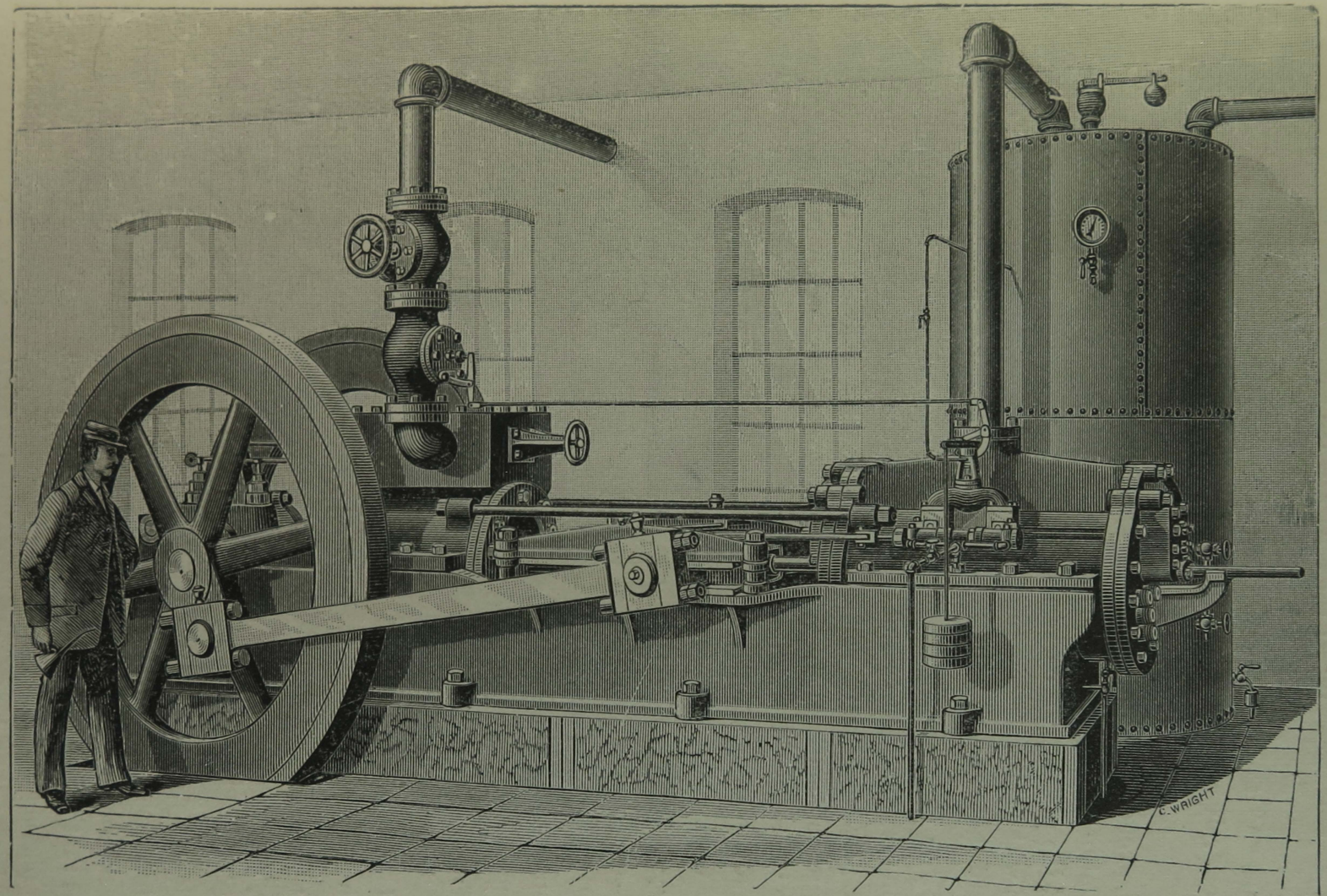
Simple in construction.
Strong and durable.
Cannot get out of order.
Works automatically.
Requires no attention.
Saves valuable machinery.
Saves labor.
Saves coal.
Guaranteed to change speed of engine on a variation of 2 lbs. pressure in the main.
Is very sensive, yet positive in its action.
Positively prevents over pressure.
Avoids shock or jar or water ram.
Saves bursting mains or hose.
Relieves the engineer of the constant care of the throttle.
An ornament to the engine room.
Invaluable for safety and economy
Has no equal.

To attach, connect the Governor in steam pipe, between steam chest and throttle valve, and as close as possible to the steam chest, so as to admit live steam at branch inlet to double unbalanced valve. The steam raises this valve, fills the shell and passes to steam chest below. Tap water main, or pipe, near pump, and with gas pipe, connect to top of pipe work on Governor. This will bring water pressure on top of piston in cylinder. This will then give the upward pressure of the steam on valve stem, and downward pressure of water on piston rod, which can be readily regulated by screwing, up or down, on regulating device in yoke, to any pressure desired. Full directions sent with every Governor.

PRICE LIST.

SCREWED.		FLANGED.	
½ inch	$ 25 00	2 inch	$ 50 00
¾ inch	27 50	2½ inch	60 00
1 inch	30 00	3 inch	75 00
1¼ inch	35 00	3½ inch	87 50
1½ inch	42 50	4 inch	100 00
2 inch	50 00	5 inch	125 00
2½ inch	58 00	6 inch	150 00

With Flanged—Flanges, Bolts and Gaskets furnished complete.



INGERSOLL-SERGEANT "STRAIGHT LINE" AIR COMPRESSOR.

STEAM DRIVEN, CLASS A.

With Piston Air Inlet Valves and Automatic Unloading Device.

THE INGERSOLL-SERGEANT "STRAIGHT LINE" AIR COMPRESSORS.

WITH PISTON AIR INLET.

OUR CLASS "A" COMPRESSORS are of the horizontal straight line steam actuated type, and are entirely self-contained, the shaft and both cylinders being carried on a solid bed.

THIS CONSTRUCTION admits of great strength and capacity in small space, inexpensive foundations, and easy transportation. Every part of the machine is very accessible, and the pistons can be removed from either cylinder in a short time, with ordinary tools, without disturbing the fly wheels, shaft or valve connections, though it is seldom indeed that any attention is necessary, save an occasional oiling.

THIS TYPE OF COMPRESSOR is well suited for general mining and tunneling work, where a machine is expected to stand the most severe usage in regions so remote from facilities for repair work as to make a break down a serious matter, and its great capacity for hard and continuous service, together with its economy in steam consumption, has made it a deserved favorite for plants of a permanent character. We have patterns for many different proportions and modifications of the standard type, thus adapting it for work varying between wide limits.

THE INGERSOLL-SERGEANT COMPRESSORS are built on the lines which a long experience has proven to possess the most features of merit, *i. e.*, power and resistance in straight lines, positive movement of air valves, cold induction air, cooling by complete surface jacketing, resulting in dry air, adjustable cut-off for the economical use of steam, smallest clearance spaces, automatic speed and pressure regulation, medium stroke, high rotative speed, crank pins, shafts, and slides of extra large bearing surfaces, and automatic lubrication throughout.

It is evident that a compressor which has the steam and air pistons on a single straight rod, thus securing a direct thrust and pull, will apply the power in the most direct manner, will be of the simplest possible construction, with few moving parts to absorb power by friction, and with all parts carried on a single strong bed-plate is impossible to get out of line, no matter what the foundation may be.

It is evident, however, that this straight line, or direct construction, results in an engine which has the greatest power when there is no work to perform. At the beginning of the stroke steam is admitted at full boiler pressure behind the piston, the air piston being at that time also at the beginning of its travel, with no resistance to overcome. As the pistons move forward the air pressure rapidly increases, while the steam supply, having been cut off by the valve at an early point in its travel to secure the benefits of expansion, rapidly falls in pressure.

FOR SPECIFICATIONS, SEE NEXT PAGE.

TABLE SHOWING OTHER DIMENSIONS OF "STRAIGHT-LINE" COMPRESSORS—STEAM DRIVEN, CLASS "A."

Telegraph Number of Compressor.	Dimensions of Cylinders.			Size of Pipes.					Size of Fly Wheels.		Floor Space.				Approximaee Weights.			Number of Bricks in Foundation.
	Steam. Inches.	Air. Inches.	Length of Stroke. Inches.	Steam Inches.	Exh'st. Inches.	Air. Inches.	Circulating Water. Inches.	Drip. Inches.	Diam. Ft. In.	Diam. of Shaft. Inches.	Length Over All. Ft. In.	Width Over All. Ft. In.	Height Above Found. Ft. In.	Length of Bed-Plate. Ft. In.	Two Fly-Wheels and Shaft. Pounds.	Heaviest Piece Bed-Plate. Pounds.	Complete Compressor. Pounds.	
1	**10**	**10¼**	**12**	**2½**	**3**	**3**	**¾**	**½**	**3 4**	**4**	**10 2**	**3 0**	**2 8**	**7 10**	**1,050**	**957**	**5,500**	**2,600**
2	10	12¼	12	2½	3	3½	¾	½	3 4	4	10 2	3 0	2 8	7 10	1,050	957	5,600	2,600
3	10	12¼	14	2½	3	3½	¾	½	4 4	5	12 6	3 9	3 4	9 5	2,550	1,650	7,300	4,300
4	10	14¼	14	2½	3	3½	¾	½	4 4	5	12 6	3 9	3 4	9 5	2,550	1,650	7,500	4,300
5	**12**	**12¼**	**14**	**3**	**4**	**3½**	**¾**	**½**	**4 4**	**5**	**12 6**	**3 9**	**3 4**	**9 5**	**2,550**	**1,650**	**7,400**	**4,300**
6	12	14¼	14	3	4	3½	¾	½	4 4	5	12 6	3 9	3 4	9 5	2,550	1,650	7,600	4,300
7	**14**	**14¼**	**18**	**3½**	**4**	**3½**	**¾**	**¾**	**5 0**	**6**	**15 0**	**4 3**	**4 0**	**11 8**	**3,125**	**2,900**	**10,800**	**8,700**
8	14	16¼	18	3½	4	4	¾	¾	5 0	6	15 0	4 3	4 0	11 8	3,125	2,900	11,100	8,700
9	14	18¼	18	3½	4	5	¾	¾	5 6	6	15 3	4 3	4 3	11 8	3,700	2,900	11,400	8,700
10	**16**	**16¼**	**18**	**4**	**5**	**4**	**¾**	**¾**	**5 6**	**6**	**15 3**	**4 3**	**4 3**	**11 8**	**3,700**	**2,900**	**12,000**	**8,700**
11	16	18¼	18	4	5	5	¾	¾	5 6	6	15 3	4 3	4 3	11 8	3,700	2,900	12,500	8,700
12	**18**	**18¼**	**24**	**5**	**5**	**5**	**1**	**¾**	**6 0**	**7**	**18 7**	**5 3**	**4 9**	**14 7**	**6,100**	**4,950**	**20,050**	**11,000**
13	18	20¼	24	5	5	5	1	¾	6 0	7	18 7	5 3	4 9	14 7	6,100	4,950	20,400	11,000
14	18	22¼	24	5	5	5	1	¾	6 0	7	18 7	5 3	4 9	14 7	6,100	4,950	20,700	11,000
15	18	24¼	24	5	5	6	1	¾	6 0	7	18 7	5 3	4 9	14 7	6,100	4,950	20,700	11,000
16	**20**	**20¼**	**24**	**5**	**6**	**5**	**1**	**¾**	**7 0**	**7**	**19 1**	**5 3**	**5 3**	**14 7**	**7,200**	**4,950**	**21,400**	**11,000**
17	20	22¼	24	5	6	5	1	¾	7 0	7	19 1	5 3	5 3	14 7	7,200	4,950	21,700	11,000
18	20	24¼	24	5	6	6	1	¾	7 0	7	19 1	5 3	5 3	14 7	7,200	4,950	21,700	11,000
19	**22**	**22¼**	**24**	**5**	**6**	**5**	**1**	**¾**	**7 0**	**7**	**19 1**	**5 3**	**5 3**	**14 7**	**7,200**	**4,950**	**22,200**	**11,000**
20	22	24¼	24	5	6	6	1	¾	7 0	7	19 1	5 3	5 3	14 7	7,200	4,950	22,500	11,000
21	22	24¼	30	6	6	6	1	1	8 0	8	22 0	6 0	6 0	17 0	10,500	7,000	34,200	15,500
22	**24**	**24¼**	**30**	**6**	**7**	**6**	**1**	**1**	**8 0**	**8**	**22 0**	**6 0**	**6 0**	**17 0**	**10,500**	**7,000**	**34,500**	**15,500**
23	24	22¼	30	6	7	6	1	1	8 0	8	22 0	6 0	6 0	17 0	10,500	7,000	34,200	15,500

Special designs for any duty built to order, or sectionalized for mule-back transportation. Prices next page.

INGERSOLL-SERGEANT "STRAIGHT LINE" PISTON INLET AIR COMPRESSORS.

CLASS A.—Steam Actuated, with Water Jacketed Air Cylinder and Heads.

This Compressor is complete in itself, both the steam and air cylinder being situated on one solid bed. All strains are direct. Owing to the size and strength of the bed-plate, light foundations are sufficient, and whatever the foundation may be it is impossible for the Compressor to get out of line.

SIZES AND PRICES OF CLASS "A" COMPRESSORS.

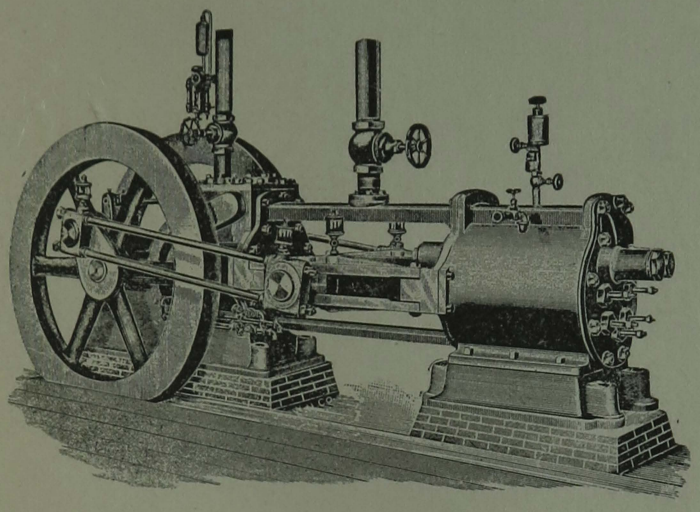
Compressor Number.	DIMENSIONS OF CYLINDERS.			Revolutions per Minute.	Piston Speed in Feet, per Minute.	CAPACITY IN FREE AIR, CUPIC FEET.		Air Pressure in Pounds.	HORSE POWER FOR GIVEN PRESSURE.		SIZE OF PIPES.		Approximate Weight of Compressors Complete.	Prices on Application.
	Steam. Inches.	Air. Inches.	Length of Stroke. Inches.			Per Minute.	Per One Revolution		For Lowest Pressure.	For Highest Pressure.	Steam Inlet. Inches.	Air Outlet. Inches.		
1	**10**	**10¼**	**12**	**120 - 160**	**240 - 320**	**133 - 177**	**1.109**	**50 - 80**	**18 - 25**	**25 - 33**	**2½**	**3**	**5,500**	
2	10	12¼	12	120 - 160	240 - 320	189 - 252	1.577	30 - 60	19 - 26	29 - 38	2½	3½	5,600	
3	10	12¼	14	116 - 155	270 - 361	213 - 285	1.839	30 - 60	21 - 29	32 - 48	2½	3½	7,300	
4	10	14¼	14	116 - 155	270 - 361	287 - 384	2.476	15 - 40	18 - 24	35 - 57	2½	3½	7,500	
5	**12**	**12¼**	**14**	**116 - 155**	**270 - 361**	**213 - 285**	**1.839**	**50 - 80**	**30 - 40**	**34 - 46**	**3**	**3½**	**7,400**	
6	12	14¼	14	116 - 155	270 - 361	287 - 384	2.476	30 - 60	30 - 40	45 - 60	3	3½	7,600	
7	**14**	**14¼**	**18**	**90 - 120**	**270 - 360**	**287 - 382**	**3.184**	**50 - 80**	**42 - 56**	**53 - 71**	**3½**	**3½**	**10,800**	
8	14	16¼	18	90 - 120	270 - 360	374 - 498	4.154	30 - 60	37 - 50	58 - 78	3½	4	11,100	
9	14	18¼	18	90 - 120	270 - 360	472 - 629	5.24	15 - 40	28 - 37	55 - 73	3½	5	11,400	
10	**16**	**16¼**	**18**	**90 - 120**	**270 - 360**	**374 - 498**	**4.154**	**50 - 80**	**54 - 72**	**69 - 92**	**4**	**4**	**12,000**	
11	16	18¼	18	90 - 120	270 - 360	472 - 629	5.24	30 - 60	48 - 64	72 - 95	4	5	12,500	
12	**18**	**18¼**	**24**	**70 - 94**	**280 - 376**	**489 - 657**	**6.988**	**50 - 80**	**68 - 93**	**88 - 118**	**5**	**5**	**20,050**	
13	18	20¼	24	70 - 94	280 - 376	602 - 809	8.606	30 - 60	63 - 84	94 - 127	5	5	20,400	
14	18	22¼	24	70 - 94	280 - 376	715 - 960	10.212	15 - 40	44 - 59	87 - 117	5	5	20,700	
15	18	24¼	24	70 - 94	280 - 376	858 - 1,152	12.251	15 - 40	52 - 70	103 - 138	5	6	20,700	
16	**20**	**20¼**	**24**	**70 - 94**	**280 - 376**	**602 - 809**	**8.606**	**50 - 80**	**88 - 108**	**112 - 150**	**5**	**5**	**21,400**	
17	20	22¼	24	70 - 94	280 - 376	715 - 960	10.212	30 - 60	76 - 101	108 - 152	5	5	21,700	
18	20	24¼	24	70 - 94	280 - 376	858 - 1,152	12.251	15 - 40	52 - 70	103 - 138	5	6	21,700	
19	**22**	**22¼**	**24**	**70 - 94**	**280 - 376**	**715 - 960**	**10.212**	**50 - 80**	**106 - 142**	**134 - 180**	**5**	**5**	**22,200**	
20	22	24¼	24	70 - 94	280 - 376	858 - 1,152	12.251	30 - 60	90 - 115	134 - 180	5	6	22,500	
21	22	24¼	30	56 - 75	280 - 375	858 - 1,149	15.314	30 - 60	90 - 121	135 - 181	6	6	34,200	
22	**24**	**24¼**	**30**	**56 - 75**	**280 - 375**	**858 - 1,149**	**15.314**	**50 - 80**	**126 - 168**	**160 - 214**	**6**	**6**	**34,500**	
23	24	22¼	30	56 - 75	280 - 375	723 - 968	12.903	70 -100	129 - 173	152 - 204	6	6	34,200	

The darker figures represent our regular standard sizes (*i. e.*, steam and air cylinders of equal diameter), suitable for running rock drills, coal cutters, and other machines requiring air pressure of 60 to 100 lbs.

Size No. 7 and larger sizes are furnished with Meyer's adjustable cut-off on steam engine.

Above prices include automatic speed and pressure regulator, with unloading device. All sizes are furnished with automatic sight feed lubricators for steam and air cylinders, all necessary oil cups, foundation bolts and washers.

Foundation plans furnished with each Compressor, also printed instructions for erecting and operating.



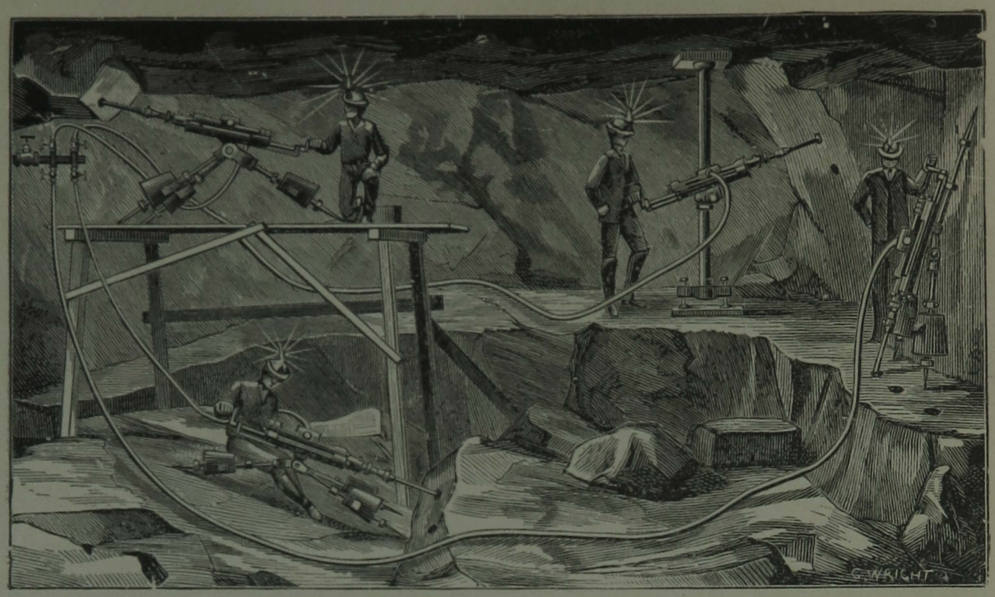
THE LEYNER AIR COMPRESSORS.

These Compressors have been on the market for the past two years, and while we can not claim as large a number of orders as some of our older competitors, we are certainly very much pleased with results, both as to sales and the satisfaction that our Compressors have given to purchasers.

The engraving gives a clear idea of the general design and arrangement of the LEYNER AIR COMPRESSOR. The machine is thoroughly made throughout; the best material and workmanship obtainable are employed in its construction; every machine is warranted to perform its work in a satisfactory manner and to meet the requiremennts of the most exacting purchaser for this class of machinery; the machine is very heavy; the fly wheels are turned true and put in running balance; the air cylinder is provided with improved water circulating jacket to keep it cool, and the clearance in the air cylinder is reduced to the lowest practical amount; the inlet valves are of steel with bronze seats, and are so arranged as to be very sensitive; the outlet valves are of bronze. Sight feed lubricators are provided throughout, and all journals and wearing parts are large and well provided for lubrication.

SPECIFICATIONS.

Size of air and steam cylinder ..... inches	9x12	13½x16	17x20
Number of revolutions per minute	100 to 200	125 to 175	....
Capacity of 3-inch drills, 8000 feet altitude	1	3	....
Capacity of 2¾-inch drills, 8000 feet altitude	2	3	....
Horse-Power of boiler needed	20	40	....
Steam pipe from boiler..... incnes	1½	2½	....
Exhaust ..... "	2	3	....
Main to receiver..... "	2	3	....
Size of receiver furnished..... "	24x60	30x96	....
Water circulation to jacket inlet ..... "	¾	¾	....
Water circulation to jacket outlet..... "	¾	¾	....
Shipping weight..... pounds	2800	6500	....
PRICE	$700.00	$1,500	$2,500



SINKING, DRIFTING AND STOPING, WITH INGERSOLL-SERGEANT DRILLS.

THE SERGEANT AUXILIARY VALVE DRILL.

The Ingersoll-"Sergeant" Auxiliary Valve Drill was designed for the hard service expected of a machine in shaft sinking, heading work, and other mining operations where rapid progress must be made through hard and blocky ground. The design and purpose of the inventor was to strike a hard blow, and to so build the machine that it would stand the hardest usage and be readily kept in repair with the facilities available in regions remote from machine shops.

Special attention is given to the construction of every part, this work being put in the hands of the most skilled and careful mechanics, and the material used is selected with special reference to the severe strains encountered by a machine which must pound a hole in the hardest kind of material, by sheer force, standing the shocks and jars of perhaps 150,000 to 200,000 heavy blows per day.

The experience of the last seven years, during which time valuable improvements have been added, has proven conclusively that the drill is not only remarkably efficient, but does its work well after years of service. Many drills of this pattern are at work which have been out five years, the repairs being confined to a few inexpensive bolts and springs, in many cases replaced by the mine or quarry blacksmith.

In the Zigzag Tunnel the remarkable progress of 345 feet of 10x10 feet heading was made in one month with two of these machines. They have records of 1,254 feet of hole drilled with one machine in limestone in six consecutive days of ten hours each, and 100 feet of hole has been drilled in 3½ hours in hard sandstone.

For Prices, see Next Page.

DESCRIPTIVE TABLE OF "SERGEANT" ROCK DRILLS.

Letter Indicating Size	A	C	D	E	F
Diameter of Cylinder	2 in.	2¾ in.	3 in.	3¼ in.	3½ in.
Length of Stroke	4½ in.	6½ in.	6½ in.	6½ in.	7 in.
Extreme Length of Dr ll, from end of Crank to end of Piston	36 in.	50 in.	50 in.	50 in.	55 in.
Length of Feed	12 in.	24 in.	24 in.	24 in.	24 in.
Diameter of Supply Inlet	½ in.	1 in.	1 in.	1 in.	1 in.
Weight of Machine (unmounted)	126 lbs.	230 lbs.	247 lbs.	260 lbs.	370 lbs.
Weight of Tripods, without weights	64 lbs.	158 lbs.	158 lbs.	195 lbs.	272 lbs.
Shipping Weight of Drill, Tripod, Weights and Wrenches, Complete, (boxed)	350 lbs.	700 lbs.	711 lbs.	775 lbs.	1000 lbs.
Approximate strokes per minute, with 60 lbs. pressure at Drill	500	375	350	350	300
Approximate weight of blow delivered on the rock at each stroke	250	500	550	650	750
Depth Drilled without changing bits	12 in.	24 in.	24 in.	24 in.	24 in.
Average work done for 10 hours, in granite, down holes, including time lost in setting drill and changing bits	.....	70 ft.	70 ft.	75 ft.	75 ft.
Depth of vertical hole each machine will drill easily	4 ft.	10 ft.	14 ft.	14 ft.	20 ft.
Diameter of holes drilled as desired	From - -	5/8 to 1¼ in.	1¼ to 2¼ in.	1½ to 2¼ in.	1¾ to 2¾ in.	1¾ to 3 in.
Diameter of drill steel used	Inch - -	5/8 to ¾ in.	1 to 1⅛ in.	1⅛ to 1¼ in.	1⅛ to 1¼ in.	1¼ to 1⅜ in.
Size of Shanks	5/8 and ¾ in.	1 in.	1⅛ in.	1⅛ in.	1¼ in.
Number of pieces in set of steels to drill holes of depths above stated	4	5	7	7	10
Approx. weight of one set steels to drill vertical holes of depths above stated	20 lbs.	104 lbs.	225 lbs.	225 lbs.	531 lbs.
Best size of Boiler to give plenty of steam at high pressure	5 h. p.	8 h. p.	8 h. p.	10 h. p.	10 h. p.
Best size of Supply Pipe, carrying Steam 100 to 200 feet	¾ in.	1 in.	1 in.	1 in.	1¼ in.
Price of Drill, unmounted (without Tripod or Column)	$ 170	$ 250	$ 275	$ 300	$ 320
Price of Adjustable Tripod, Complete	$ 30	$ 50	$ 50	$ 50	$ 55
Price of Drill and Tripod, with Wrenches and Weights, Complete	$ 200	$ 300	$ 325	$ 350	$ 375

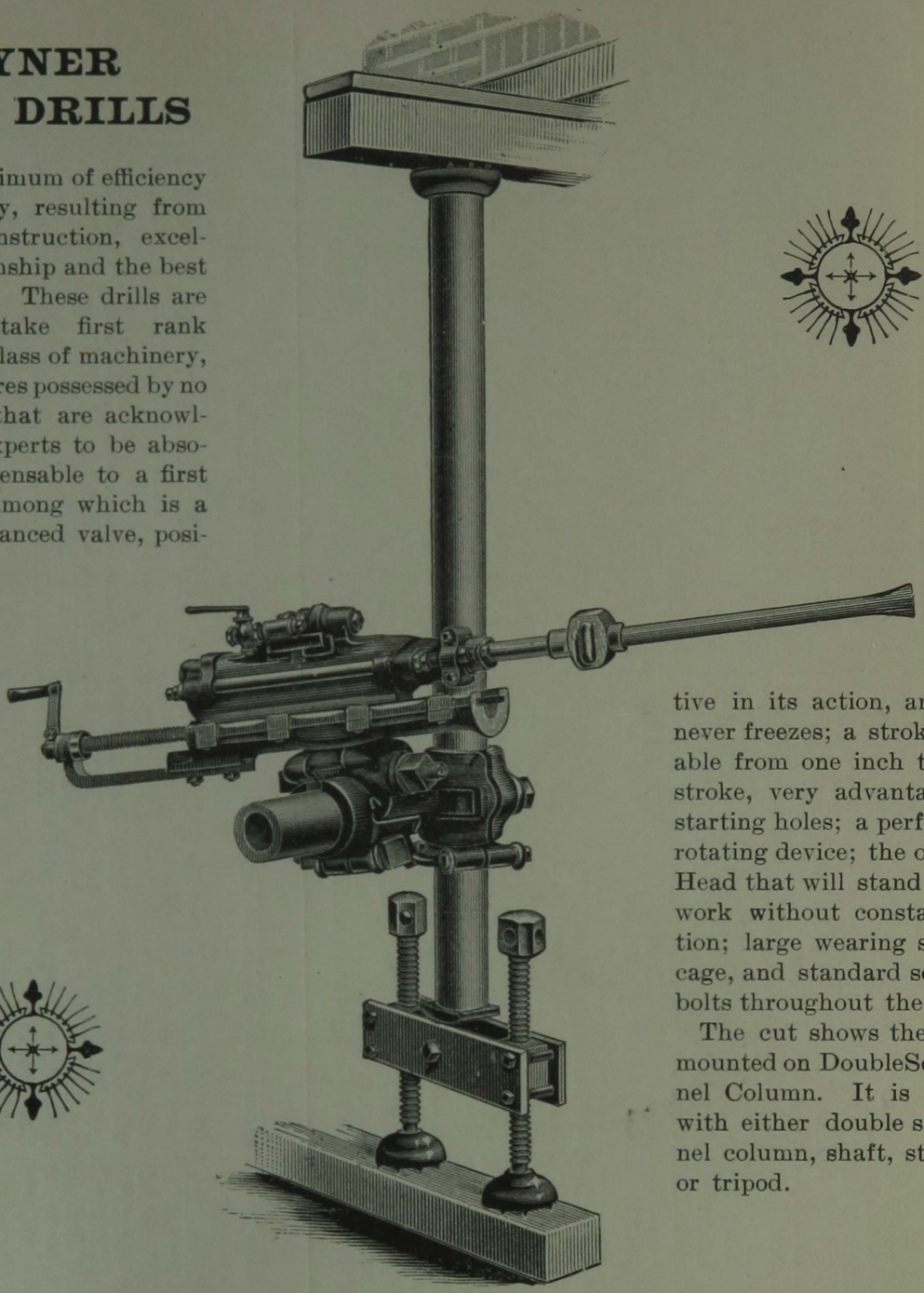
SIZES AND WEIGHTS OF COLUMNS FOR SERGEANT ROCK DRILLS.

	Weight. 6 Ft. Long.	Weight. 8 Ft. Long.	Price.
4½ inch Double Screw Tunnel Column, with Arm and Clamp, Complete (for 2¾ to 3¼ in. Drills inclusive)	280 lbs.	300 lbs.	$ 60 00
Double Screw 4½ inch Column, **without Arm or Clamp,** for 2¾ to 3½ inch Drills, inclusive	180 lbs.	200 lbs.	36 00
4½ inch Clamp, 40 lbs., $13; 4½ inch Adjustable Arm, for use in Tunnel or Drift, 60 lbs., $11.			
5½ inch Double Screw Tunnel Column, with Arm and Clamp, Complete (for 3½ inch Drills)	400 lbs.	420 lbs.	80 00
Double Screw 5½ inch Column, **without Arm or Clamp,** for 3½ inch Drills	240 lbs.	260 lbs.	50 00
5½ inch Tunnel Clamp, 70 lbs., $17; 5½ inch Adjustable Arm, for use in Tunnel or Drift, 90 lbs., $13.			
3 inch Column, with Arm and Clamp, Complete for mounting 2 inch Baby Drills	180 lbs.	200 lbs.	45 00
3 inch Column Clamp, Complete, without Column, $12.			
Plain Shaft Bar, 5½ in. diam., 6 to 8 ft. long, and Clamp, for mounting 3½ in. Drills	215 lbs.	235 lbs.	67 00
Plain Shaft Bar, 4½ in. diam., 6 to 8 ft. long, and Clamp, for mounting 2¾ to 3½ in. Drills, inclusive	160 lbs.	180 lbs.	50 00
3 in. Quarry Bar for Drills "A" and "C," for Gadding, Channeling, and Plug and Feather Work, on Dimension Stone	500 lbs.	175 00
Standard Quarry Bar for Drills "C" to "F" inclusive; weight of bar, 828 lbs., with weights, 1325 lbs.			250 00

All Prices given in this Catalogue are based on Delivery on Board Cars in New York City, or Easton, Pa.

LEYNER ROCK DRILLS

Are the maximum of efficiency and economy, resulting from a simple construction, excellent workmanship and the best of materials. These drills are certain to take first rank among this class of machinery, having features possessed by no other drill, that are acknowledged by experts to be absolutely indispensable to a first class drill, among which is a perfectly balanced valve, positive in its action, and which never freezes; a stroke adjustable from one inch to the full stroke, very advantageous in starting holes; a perfect safety rotating device; the only Front Head that will stand up to its work without constant attention; large wearing surface in cage, and standard screws and bolts throughout the machine.



The cut shows the machine mounted on DoubleScrew Tunnel Column. It is furnished with either double screw tunnel column, shaft, stoping bar or tripod.

SPECIFICATIONS.

Diameter of cylinder	2¾ in.	3 in.	3¼ in	3½ in.
Length of stroke	5 "	6 "	6½ "	6½ "
Extreme length	42 "	46 "	48 "	49 "
Length of feed	24 "	24 "	24 "	24 "
Diameter of air or steam supply inlet	¾ "	1 "	1 "	1 "
Diameter of holes drilled	1¼- 2 "	1¼-2½ "	1¼-3½ "	1¼-3½ "
Diameter of steel used	1-1⅛ "	1⅛-1¼ "	1⅓-1½ "	1⅛-1½ "
Size of shank	1x5 "	1⅛x5 "	1⅛x5 "	.....
Approximate number strokes per minute	200-600 "	200-600 "	200-600 "	200-600 "
Depth of hole machine will drill easily	10 ft.	15 ft.	20 ft.	25 ft.
Weight of machine (bare)	230 lbs.	285 lbs.	310 lbs.	350 lbs.
Price	$275 00	$285 00	$300 00	$330 00

AIR RECEIVERS AND PRESSURE TANKS.

FOR 110 POUNDS WORKING PRESSURE.

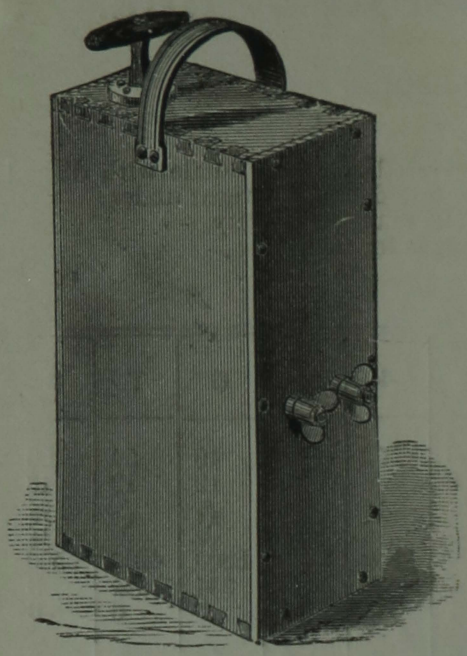
Made of the best 60,000 pounds t. s. Steel, side seams double riveted; strongly made with dished heads and tested up to 165 pounds water pressure; warranted safe and tight under 110 pounds working pressure. Fixtures will include manhead, safety valve, pressure gauge, drain cocks, and flanges for inlet and discharge pipes.

NUMBERS.	1	2	3	4	5	6	7	8
Diameter ..... inches	30	36	36	42	42	48	54	66
Length ..... feet	6	6	8	8	10	12	12	18
Thicknes of Shell ..... inches	1/4	1/4	1/4	1/4	1/4	9/32	5/16	3/8
Thickness of Heads ..... inches	5/16	3/8	3/8	3/8	3/8	7/16	7/16	1/2
Weight, about ..... pounds	1000	1300	1600	1900	2200	3300	4200	5500
Diameter of Safety Valves ..... inches	1½	1½	1½	2	2	2½	2½	3
Diameter of Inlet and Discharge Flanges "	2½	3	3½	3½	4	5	6	8
Number of 3⅛-inch Drills Receiver is best adapted for	1	2	3	5	8	12	20	35
Compressor Capacity Receiver is best adapted for (cubic feet free air per minute)	150 or less	150 to 200	200 to 300	300 to 500	500 to 700	700 to 1200	1200 to 3000	3000 and over
Price, f. o. b. factory, complete	$90	$110	$120	$135	$150	$180	$210	$365

TABLE SHOWING CUBIC FEET OF FREE AIR REQUIRED

TO RUN FROM ONE TO FORTY MACHINES WITH SIXTY POUNDS PRESSURE.

Number of Machines.	ROCK DRILLS.								COAL CUTTERS.	
	A 2-Inch.	B 2½-Inch.	C 2¾-Inch.	D 3-Inch.	E 3¼-Inch.	F 3½-Inch.	G 4¼-Inch.	H 5-Inch.	3½-Inch.	4-Inch.
1	65	70	95	110	115	125	140	165	70	93
2	110	120	160	190	200	230	250	280	140	186
3	156	174	234	279	294	333	360	405	210	279
4	196	220	304	356	372	428	460	524	280	372
5	230	260	370	425	445	510	555	635	350	465
6	264	294	426	486	516	588	642	738	420	558
7	294	329	476	546	581	658	721	826	490	651
8	320	360	520	600	640	720	800	920	560	744
9	360	405	585	675	720	810	900	1035	630	837
10	400	450	650	750	800	900	1000	1150	700	930
12	480	540	780	900	960	1080	1200	1380	840	1116
15		675	975	1125	1200	1350	1500	1725	1050	1395
20			1300	1500	1600	1800	2000	2300	1400	1860
25			1625	1875	2000	2250	2500	2775	1750	2325
30			1950	2250	2400	2700	3000	3450	2100	2790
40			2600	3000	3200	3600	4000	4600	2800	3720



ELECTRIC BLASTING MACHINES.

The Blasting Machine which has the greatest sale at the present time is a magneto-electric instrument of small size, weighing only about sixteen pounds, occupying considerably less than one-half a cubic foot of space.

The capacity of this machine is for about twelve or fifteen holes, though under entirely favorable circumstances many more can be fired.

Magneto-Electric Blasting Machine, No. 3	$ 25 00
Magneto-Electric Blasting Machine, No. 4 (Larger)	50 00

FUZES.

These are the fuzes which are to be used with the "Magneto" Machines.

The cut shows in section a platinum fuse nearly of actual size.

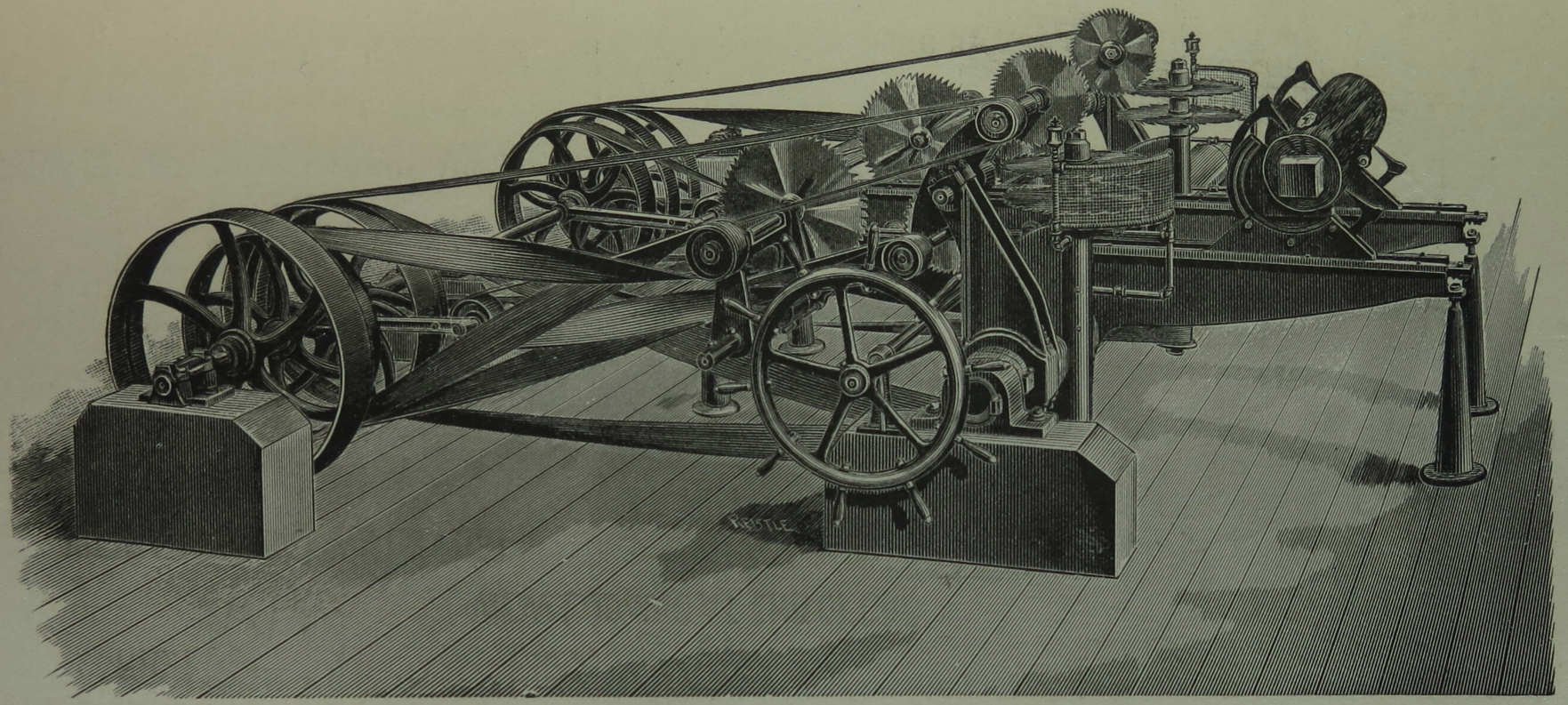
PLATINUM FUZES—Cotton Covered (50 in a bundle.)

4 foot wires	per 100 Fuzes, $ 3 00
6 foot wires	per 100 Fuzes, 3 54
8 foot wires	per 100 Fuzes, 4 08
10 foot wires	per 100 Fuzes, 4 62
12 foot wires	per 100 Fuzes, 5 16
14 foot wires	per 100 Fuzes, 5 70
16 foot wires	per 100 Fuzes, 6 24
18 foot wires	per 100 Fuzes, 6 78
20 foot wires	per 100 Fuzes, 7 32

Fuzes with longer wires at the rate of one-half of one cent, per foot, additional—a double cover being necessary for long fuzes.

Leading Wire, Cotton Covered	40 cents per lb.
Connecting Wire, Cotton Covered	40 cents per lb.

☞Fuzes with extremely long Wires will be made to order, only.



HENDEY MINE TIMBER FRAMING MACHINE.

Can be operated by any ordinary mechanic with a helper, and will do the work of twenty skilled carpenters in the same time and more accurately. Round or square logs are handled equally well.

See next page for sample of work.

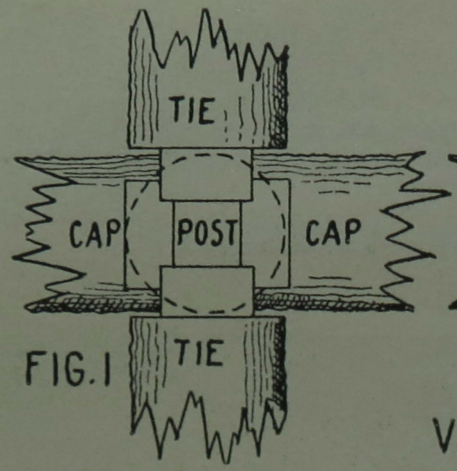


FIG. 1
VIEW LOOKING DOWN ON POST

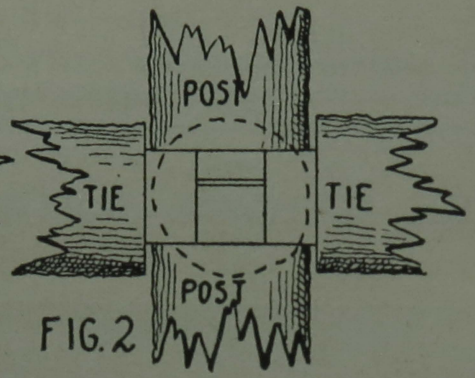


FIG. 2
VIEW LOOKING AT END OF CAP

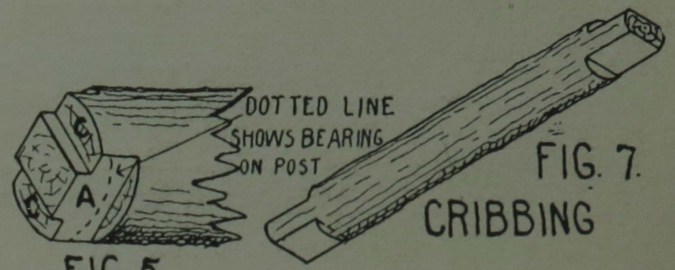


FIG. 5

FIG. 7.
CRIBBING

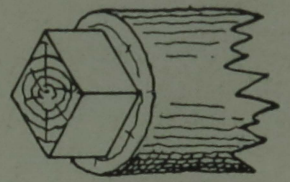


FIG. 6 VIEW OF END OF TIE

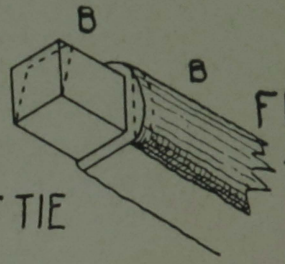


FIG. 8
TUNNEL CAP

FIG. 3
VIEW OF TOP END OF POST

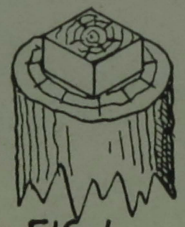


FIG. 4
VIEW OF BOTTOM END OF POST

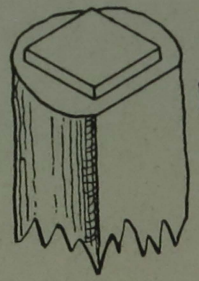
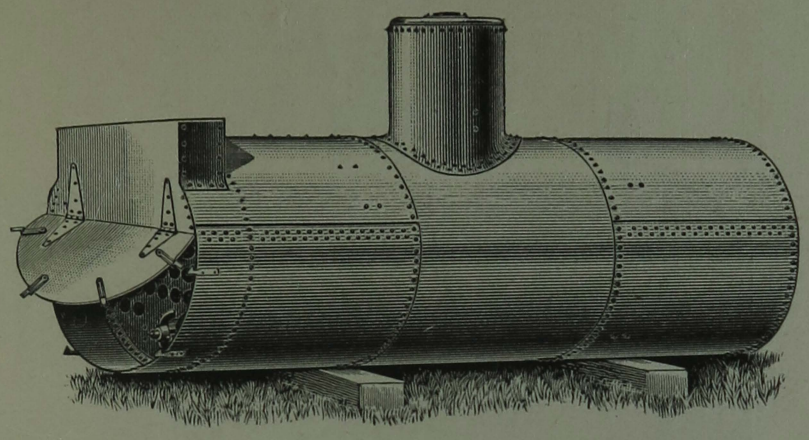


FIG. 9
TUNNEL POST

SAMPLES OF WORK DONE BY

HENDEY'S NEW MINE TIMBER FRAMING MACHINE.



HORIZONTAL FLANGE STEEL TUBULAR BOILERS

WITH FIXED DOME.

SPECIFICATIONS.

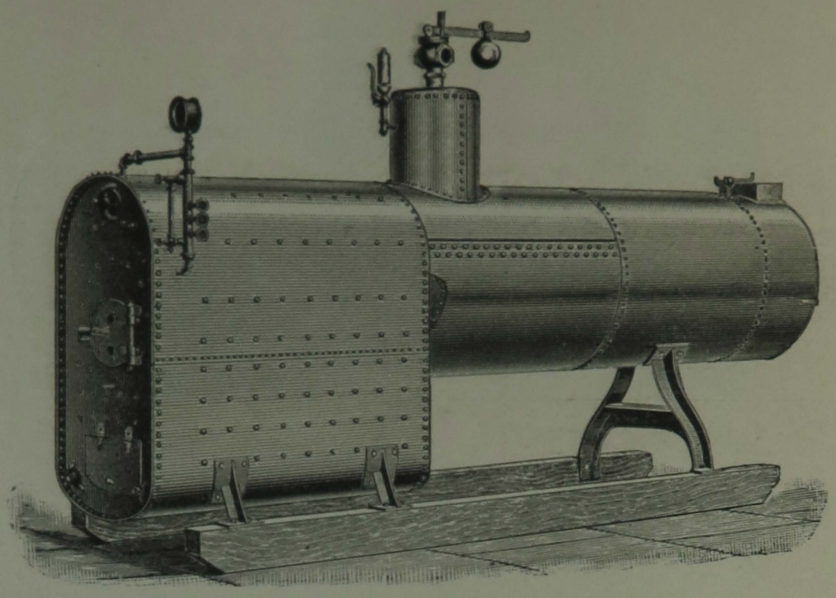
Estimate Number.	Nominal Rated Horse Power.	SHELL. Diameter. Inches.	SHELL. Length. Feet.	Depth of Smoke Box In.	THICKN'SS OF BOILER PLATE. Shell. Inches.	THICKN'SS OF BOILER PLATE. Heads. Inches.	DOME. Diameter. Inches	DOME. Height. Inches.	Size Steam Outlet. In	TUBES. Number.	TUBES. Diameter. Inches.	TUBES. Length. Feet.	Total Heating Surface. Sq. Ft.	STACK. Diameter. Inches.	STACK. Length. Feet.	SHIPPING WEIGHT. Pounds Approximate. Boiler Only	Fixtures Only.	Boiler and Fixtures.
15 L	15	36	8	15	1/4	3/8	18	20	2	26	3	8	214	18	30	2082	1718	3800
20 L	20	36	10	15	1/4	3/8	18	20	2	26	3	10	266	18	30	2530	1770	4300
25 L	25	36	12	15	1/4	3/8	18	20	2 1/2	26	3	12	318	18	35	2970	1830	4800
30 L	30	40	12	15	1/4	3/8	20	22	2 1/2	34	3	12	404	20	40	3441	2159	5600
35 L	35	42	12	15	1/4	7/16	20	22	2 1/2	40	3	12	464	22	40	3760	2240	6000
40 L	40	46	12	15	1/4	7/16	24	24	3	42	3	12	491	22	40	4345	2355	6700
45 L	45	48	12	15	9/32	7/16	24	24	3	48	3	12	551	24	40	5045	2355	7400
55 M	55	52	14	15	9/32	7/16	28	26	3 1/2	44	3 1/2	14	693	26	40	6620	2880	9500
60 M	60	54	14	15	5/16	1/2	28	26	3 1/2	46	3 1/2	14	721	26	40	7300	3000	10300
70 N	70	54	16	15	5/16	1/2	28	26	3 1/2	40	4	16	817	26	40	8711	3089	11800
75 M	75	60	14	15	5/16	1/2	32	32	4	62	3 1/2	14	940	30	40	9180	3420	12600
85 N	85	60	16	15	5/16	1/2	32	32	4 1/2	52	4	16	1045	30	40	10643	3457	14100
100 N	100	66	16	15	3/8	1/2	32	32	4 1/2	64	4	16	1265	36	40	13294	4206	17500
125 N	125	72	16	15	3/8	1/2	32	32	5	82	4	16	1578	40	40	15900	4700	20600

Each Boiler is furnished with Dome, Smoke Box Extension, Smoke Head Door and Stack Saddle, Fire Front, Grate Bars, Bearing Bars, Back Arch Plates, Round Soot Pit Door and Frame, Safety Valve, Steam Gage and Siphon, Glass Water Gage and Gage Cocks, Check Valve, Stop Valve, Blow-Off Cock, Whistle, Smoke Stack and Guy Rods.

WILL FURNISH OUR STANDARD PLANS FOR FOUNDATIONS WITHOUT CHARGE.

Horizontal Flange Steel Tubular Boilers are carried in stock for immediate shipment.
Only strictly first quality flange steel of 60,000 pounds tensile strength is used in our Boilers.
The design is the latest approved by modern practice.
The closest possible scrutiny and investigation into the merits of these goods are invited.

PRICES ON APPLICATION.



LOCOMOTIVE FLANGE STEEL BOILERS.

CLASS P.

SPECIFICATIONS.

Estimate Number.	Nominal Rated Horse Power.	SHELL.		FIRE BOX.			DOME.		TUBES.			Total Heating Surface. Square Feet.	STACK.		SHIPPING WEIGHT. Pounds Approximate.		
		Diameter. Inches.	Length Over All. Ft. In.	Length. Inches.	Width. Inches.	Height. Inches.	Diameter. Inches.	Height. Inches.	Number.	Diameter. Inches.	Length Ft. In.		Diameter. Inches.	Length. Feet.	Boiler Only.	Fixtures Only.	Boiler and Fixtures.
10 P	10	28	9 5	30	23	36	15	16	25	2½	5 6	127	10	15	2,518	382	2,900
15 P	15	32	11 0	42	27	40	15	16	34	2½	6 0	188	12	15	3,448	552	4,000
20 P	20	34	12 8	48	29	45	16	18	40	2½	7 0	251	12	20	5,030	670	5,700
25 P	25	36	14 0	52	32	48	18	20	45	2½	8 0	315	14	25	5,975	825	6,800
30 P	30	40	15 2	54	36	48	20	22	49	2½	9 0	376	18	35	6,497	1,203	7,700
40 P	40	42	16 4	54	37	60	20	22	62	2½	10 0	510	20	40	8,540	1,360	9,900

Each Boiler, on Skids, is furnished with Dome, Grate Bars, Safety Valve, Steam Gage and Siphon, Glass Water Gage and Gage Cocks, Check Valve, Stop Valve, Blow-Off Cock, Whistle, Smoke Stack and Guy Rods.

60,000 POUNDS TENSILE STRENGTH FLANGE STEEL AND NO OTHER IS USED IN OUR BOILERS.

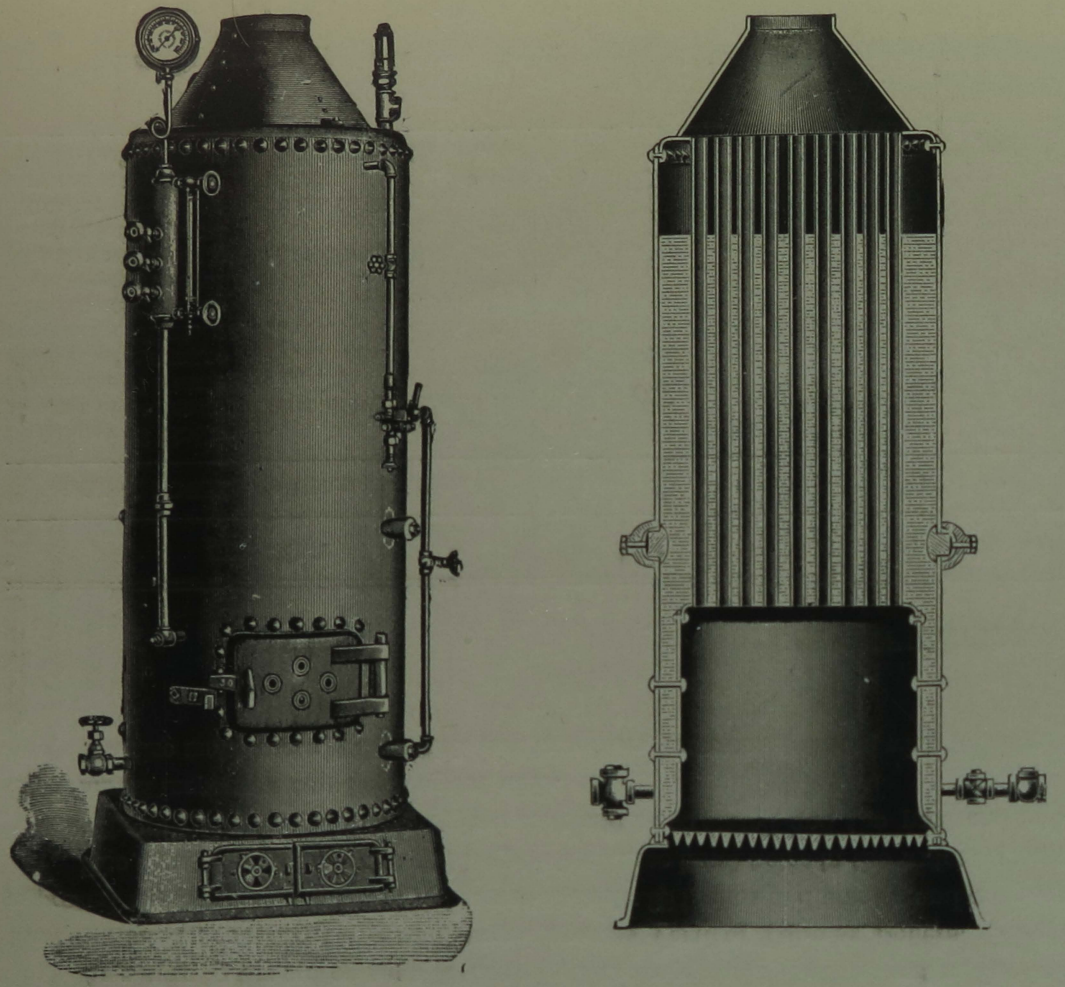
The Standard Locomotive or Portable Boiler shown above is liberally designed for the best results in heating surface.

Special attention is called to the design and proportions of the fire-box, the size and number of the tubes in the barrel.

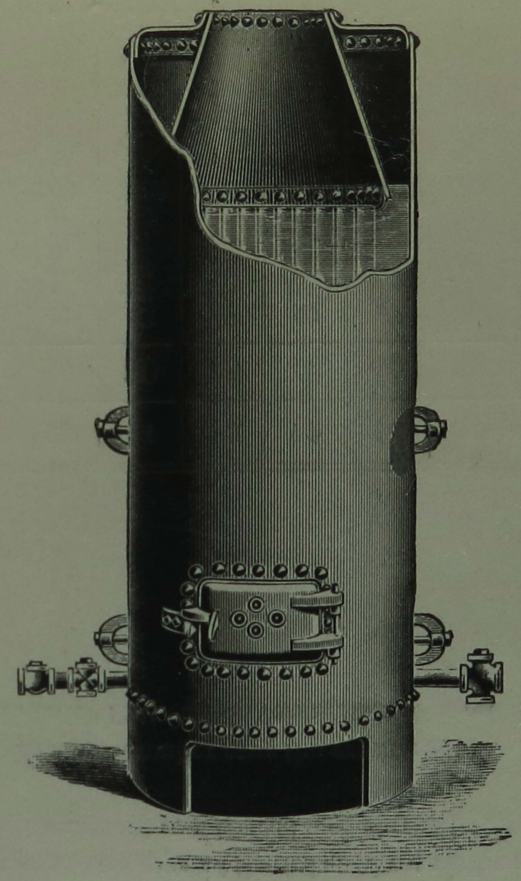
It is built for a quick-steaming Boiler, economical in the use of fuel and for easy maintenance of uniform steam.

All Boilers are combined with Standard Engines of the different styles for complete steam plants.

PRICES ON APPLICATION.



VERTICAL TUBULAR BOILERS.



VERTICAL BOILERS, SUBMERGED TUBES.

Specifications Following Pages.

VERTICAL TUBULAR BOILERS WITH SUBMERGED TUBES.

MARINE STYLE.

As shown in the cut on page 39 these boilers are so built that the water line is above the tubes, and the tops of the tubes always submerged, thus overcoming one great objection urged against Vertical Tubular Boilers. They are built of steel throughout and braced and stayed in the most approved manner. The longitudinal seams of shells 36 inches in diameter and over are double riveted.

The smaller sizes have two and larger sizes three hand holes in the water leg around the fire and the same number over the crown sheet.

When required for Marine purposes it should be so stated and the pressure to be carried given, in order that certain formalities required by the Government inspectors may be complied with.

We also make these boilers with cast iron base, the same as those with full length tubes.

SPECIFICATIONS.

NUMBERS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
HORSE POWER—As Usually Rated.	4	5	6	8	10	12	15	18	20	25	30	35	40	45	50	60
Diameter of Boiler.....inches	24	24	24	30	30	36	36	36	42	42	42	48	48	48	54	54
Height of boiler (shell extended)..ft. and in.	6-2	6-8	7-2	6-8	7-2	7-2	7-8	8-8	8-2	8-8	9-8	9 8	10-2	10-8	10-2	11-2
Diameter of Furnace.....inches	19 3/8	19 3/8	19 3/8	25	25	31	31	31	37	37	37	42	42	42	48	48
Height of Furnace..... "	24	24	24	27	27	27	27	27	27	27	27	30	30	30	30	30
Height of Chamber..... "	18	18	18	18	18	18	18	18	24	24	24	27	27	27	30	30
Thickness of Shell..... "	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	9-32	9-32	9-32	9-32	5-16	5-16	5-16	5-16
Thickness of Heads..... "	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Thickness of Fur. and Chamber Plates "	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32
Length of Tubes..... "	24	30	36	27	33	33	39	51	39	45	57	51	57	63	54	66
Number of Tubes (all 2 in. diam.).....	31	31	31	55	55	77	77	77	109	109	109	149	149	149	201	201
Square feet heating surface.....about	44	52	60	83	98	133	155	196	215	244	301	370	409	448	518	623
Weight of Boiler and Fix. complete..about	1,150	1,200	1,250	1,650	1,750	2,300	2,400	2,650	3,400	3,550	3,900	4,550	4,750	5,000	6,000	6,500

Boiler Fixtures comprise Grates, Steam Gauge, Water Gauge, Gauge Cocks, Pop Safety Valve, Blow-off Valve, Check and Stop Valves.

PRICES ON APPLICATION.

VERTICAL TUBULAR BOILERS.

The cut on page 39 shows the manner of construction of these Boilers. They are made throughout of steel of 60,000 pounds tensile strength, are strongly stayed in the most approved manner, and the workmanship throughout is first-class. The smaller sizes have two, and the larger sizes three hand-holes in the water leg around the fire, and the same number over the crown sheet.

SPECIFICATIONS.

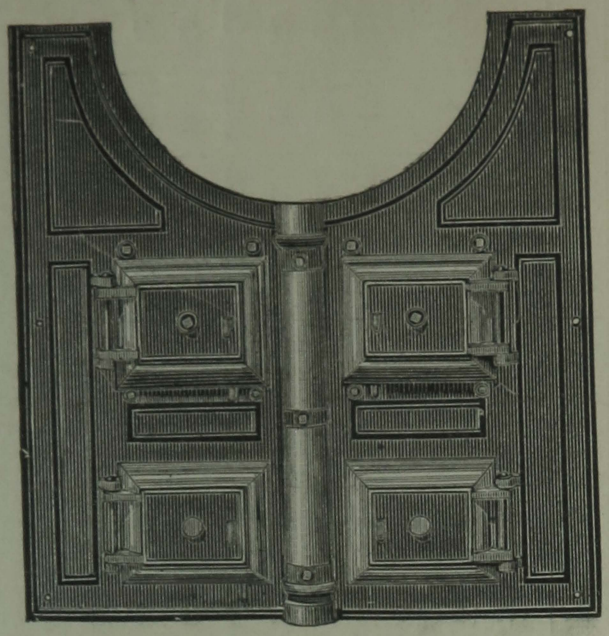
NUMBERS.	1	2	3	4	5	6	7	8	9	10	11	12	13
HORSE POWER—Nominal.	4	5	6	8	10	12	15	18	20	25	30	35	40
Diameter of Shell ..... inches	24	24	24	30	30	30	36	36	36	42	42	42	48
Height of Shell ..... "	48	60	72	60	72	84	78	84	96	87	99	111	102
Thickness of Shell ..... "	¼	¼	¼	¼	¼	¼	¼	¼	¼	9-32	9-32	9-32	5-16
Thickness of Heads ..... "	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜
Diameter of Fire Box ..... "	19⅜	19⅜	19⅜	25	25	25	31	31	31	37	37	37	42
Height of Fire Box ..... "	24	24	24	27	27	27	27	27	27	27	27	27	30
Thickness of Fire Box ..... "	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32	9-32
Number of 2-inch Tubes	31	31	31	55	55	55	77	77	77	109	109	109	149
Length of Tubes used ..... inches	24	36	48	33	45	57	51	57	69	60	72	84	72
Heating Surface ..... square feet	43	61	77	97	125	154	194	214	254	312	369	435	502
Floor to Top of Bonnet ..... inches	66	78	90	80	92	104	99	105	117	110	122	134	125
Size of Base Square ..... "	32	32	32	37	37	37	45	45	45	51	51	51	58
Diameter of Stack ..... "	8	8	8	10	10	10	12	12	12	14	14	14	16
Weight of Boiler without Fixtures, about ..... lbs.	800	950	1100	1250	1450	1650	2000	2150	2400	2900	3200	3500	4100
Weight of Fixtures ..... "	400	400	400	500	500	500	700	700	700	950	950	950	1300
Weight of Boiler and Fixtures, about ..... lbs.	1200	1350	1500	1750	1950	2150	2700	2850	3100	3850	4150	4450	5400

PRICES ON APPLICATION.

BOILER FRONTS.

LIST.

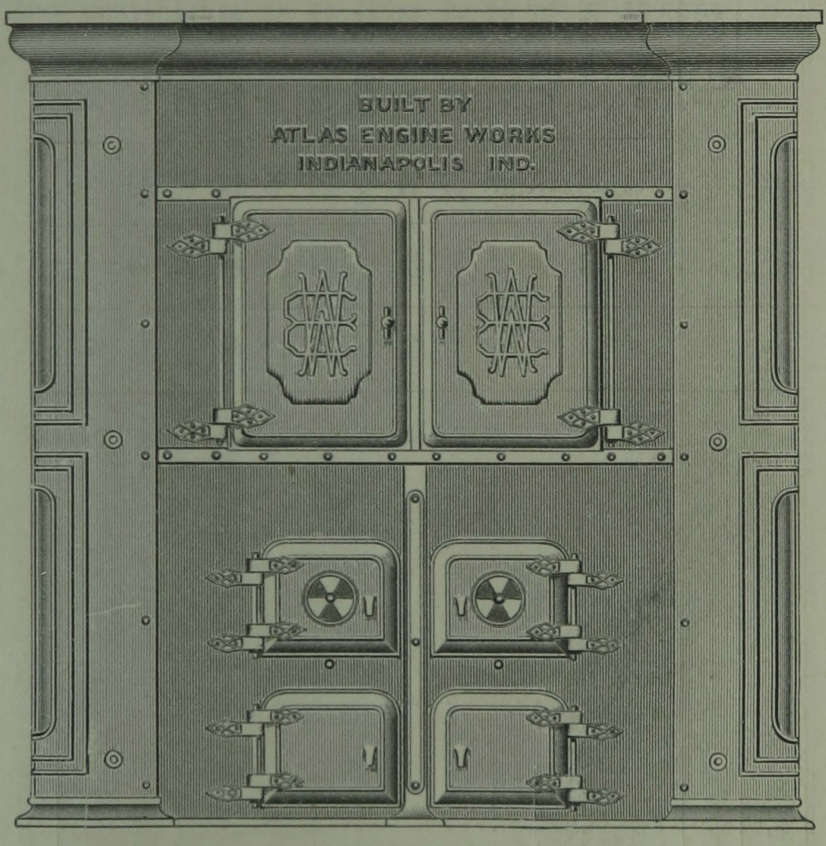
Size. Inches.		Price.
72	Double Door	$120 00
66	" "	110 00
60	" "	75 00
54	" "	70 00
48	" "	60 00



HALF ARCH.

LIST.

Size. Inches.		Price.
44	Double Door	$58 00
42	" "	52 00
36	" "	48 00
30	" "	46 00
36	Single Door...	43 00
30	" "	40 00



FULL FLUSH.

Inches. Size.		Price.
72	.....	.....
66	.....	.....
60	.....	.....
54	.....	.....
48	.....	.....

Size. Inches.		Price.
44	....	.....
42	....	.....
36	....	.....
30	....	.....

PRICES ON APPLICATION.

SMOKE STACKS.

All Sizes.....Per Pound

BUCK STAYS.

All Sizes.....Per Pound

STAY RODS.

All Lengths.....Per Pound

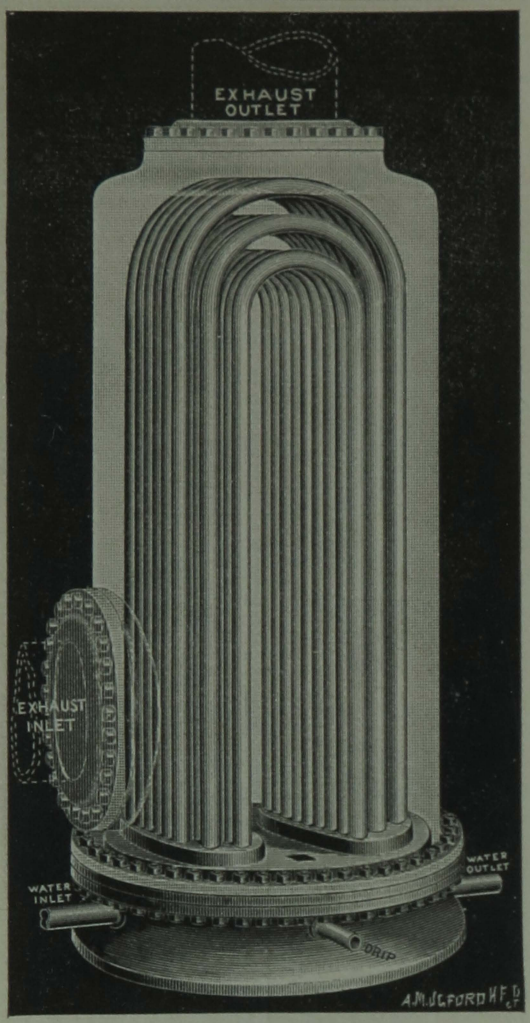
GRATE BARS.

No. of Bar. In.	Length of Bar. In.	Width of Bar. In.	Opening in Base. In.	No. of Sec. in Bar.	Weight Lbs.	Price per Square Foot.
1	60	2½	½	2	72	$2 75
2	54	2⅝	⅝	2	56	2 25
3	54	4¼	7/16	3	112	3 00
4	54	2¾	¾	2		2 25
5	52	2⅝	½	2		2 30
6	48	2¼	⅜	2	48	2 70
7	48	2½	⅝	2	45	2 15
8	48	3	⅝	2	60	2 40
53	48	2⅝	5/16	3	38	2 00
8½	46	2¼	⅜	2		
9	42	3	⅝	2		
10	40	2⅝	5/16	3	40	2 15
11	40	2¾	½	2	34	1 75
11½	40	3	⅝	2	52	2 50
12	36	2¾	5/16	2	31	1 75
13	36	2⅞	⅝	2	32	1 75
14	36	1	⅜	1	12	2 00
15	36	1¼	½	1	15	2 00
54	36	1⅛	¼	1	15	2 00

No. of Bar. In.	Length of Bar. In.	Width of Bar. In.	Opening in Base. In.	No. of Sec. in Bar.	Weight Lbs.	Price per Square Foot.
16	34	2¼	⅜	2	40	$3 00
17	33	3¼	⅜	4	30	2 05
18	32½	2⅜	½	2	31	2 15
19	30	2⅝	⅝	2	27	2 00
20	30	2¾	½	3	25	1 75
21	27⅜	3½	5/16	4	24	2 00
22	24	2¾	5/16	3	22	2 00
23	24	3	¾	2	22	1 75
24	24	2½	⅜	2	19	1 75
25	22	3½	½	3	20	1 75
27	20	1⅞	7/16	2	7½	1 75
28	15	2⅜	5/16	3	5	1 75
29	15	1	⅜	1	3½	1 75
30	15	1⅛	½	1	1½	2 00
31	14	1	⅜	1	1½	2 00
32	13	1⅛	½	1	2	2 00
33	18	18	½	17	52	1 75
34	30	20	⅝	16		1 75

ROUND GRATES FOR UPRIGHT BOILERS.

Number of Grate.	Diameter of Boiler. Inches.	Diameter of Grate. Inches.	Opening of Grate. Inches.	Weight. Pounds.	Price.
37	54	51½	7/16	500	$25 00
36	48	42½	½	475	20 00
38	42	38¾	¾	370	18 50
39	36	33	⅜	250	12 50
40	36	33	⅝	225	10 00
41	30	27½	½	120	6 00
42	24	22½	⅛	102	5 50



ADVANCE FEED WATER HEATERS.

LIST.

Number.	Extreme Dimensions. Diam Inches.	Extreme Dimensions. Height Inches.	Size of Exhaust. Inches.	Size of Feed Pipe. Inches	Horse Power.	Price.
1	15	19	2	1	15	$ 28 00
2	15	22	2	1	20	41 00
3	15	25	3	1	25	50 00
4	15	28	4	1	30	63 00
5	15	34	5	1	40	75 00
6	20	34	6	1¼	50	92 00
7	20	38	6	1¼	60	115 00
8	20	46	6	1¼	80	139 00
9	20	56	7	1¼	100	173 00
10	24	39	7	2	125	231 00
11	24	51	8	2	150	290 00
12	24	63	8	2	200	349 00
13	32	76	10	2½	300	465 00
14	45	64	10	3	400	583 00
15	45	70	12	3	500	700 00
16	45	82	12	3	600	850 00
17	45	94	12	3	700	1025 00
18	45	100	14	3	800	1300 00
19	45	124	16	4	1000	1500 00

Nos. 1 to 13 Shell, Cast-Iron. Nos. 14 to 19 Heads, Cast-Iron; Body, Shell Steel.

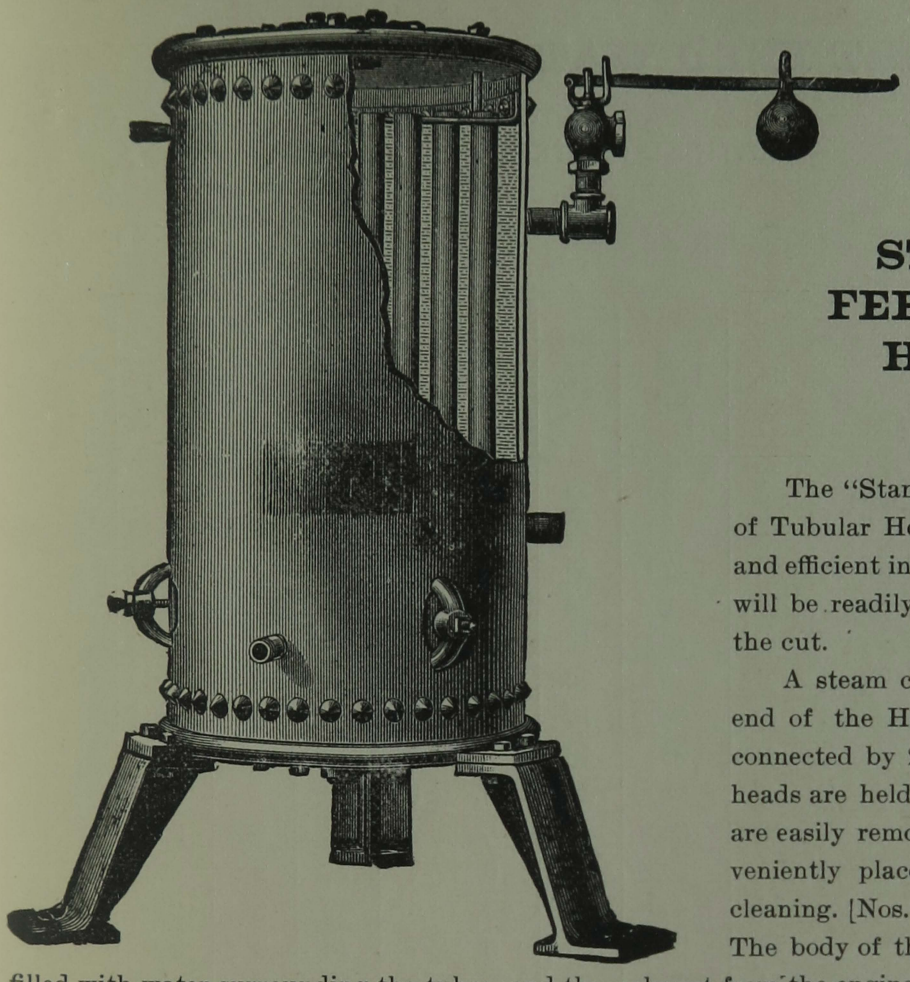
Consists of a nest of U shaped, seamless Drawn Brass Tubes, incased in a cast-iron shell. The Exhaust Steam enters the shell near the bottom, as shown in cut, and is discharged from the outlet on top of Heater. The Feed Water enters on the side near the bottom and is circulated through the nest of Brass Tubes within the cast-iron shell, and as it circulates it takes up the heat from the Exhaust Steam and is discharged from Heater on the opposite side, as shown in cut, at a temperature of from 200 to 210 degrees Fahrenheit. Great care is taken in testing the Heaters, and every Heater, after it is completed, is subjected to a cold water pressure of 175 pounds, thus insuring absolute tightness at every point.

BERRYMAN FEED WATER HEATER AND PURIFIER.

LIST.

Number.	Size. Diam. Inches.	Size. Length Inches.	Horse Power.	Exhaust. Inches.	Weight. Pounds.
1	10	30	15	2½	.....
2	12	48	30	3	.....
3	15	80	50	4	700
4	19	84	75	5	900
5	21	94	100	6	1300
6	21	99	120	6	1400
7	23	103	130	7	1500
8	25	103	160	8	1700
9	30	130	225	8	2100
10	34	130	300	10	2900
11	40	144	500	12	3900
12	45	192	750	14	6000
13	51	192	1000	16	10500

PRICES ON APPLICATION.



STANDARD FEED WATER HEATERS.

The "Standard" is a very popular form of Tubular Heater, simple in construction and efficient in operation. Its construction will be readily understood by referring to the cut.

A steam chamber is provided at each end of the Heater. The inner heads are connected by 2-inch tubes, and the outer heads are held in place by stud bolts, and are easily removed. Four hand-holes conveniently placed afford ready access for cleaning. [Nos. 9 and 10 have six hand-holes. The body of the Heater is kept constantly filled with water surrounding the tubes, and the exhaust from the engine passes through the tubes.

A Safety Valve is furnished with each Heater, but all connecting steam and water pipes are subject to order and charged extra.

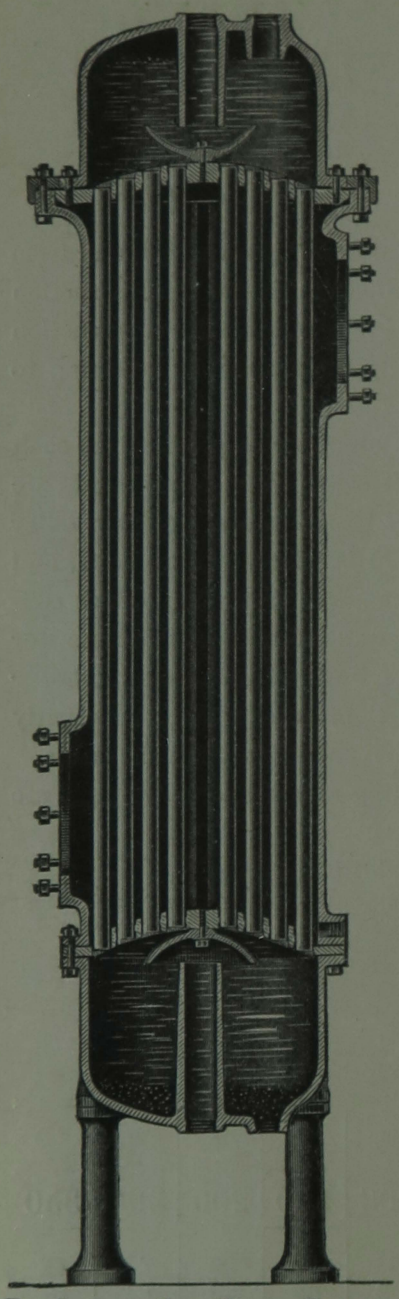
When so ordered we make these Heaters with brass tubes at an additional price.

SPECIFICATIONS.

NUMBERS.	1	2	3	4	5	6	7	8	9	10
HORSE POWER—As Usually Rated.	35	50	60	75	80	100	150	200	300	350
Diameter of Heater.....inches	20	20	20	24	24	30	30	36	42	42
Length over all ... . "	42	42	48	48	52	58	68	78	84	84
Number of Tubes, all 2 in. diam..	15	20	20	27	32	46	52	66	80	100
Length of Tubes .....inches	30	30	36	36	36	42	48	54	60	60
Thickness of Shell..... "	7/32	7/32	7/32	7/32	7/32	1/4	1/4	1/4	9/32	9/32
Thickness of Heads..... "	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Diameter of Exhaust ..... "	3	3½	4	4½	4½	6	7	10	10	10
Diameter of Feed Pipe..... "	½	¾	1	1¼	1¼	1½	2	2	2½	2½
Size of Safety Valve ..... "	1	1	1	1¼	1¼	1½	2	2	2½	2½
Weight ..... . pounds	1000	1050	1100	1300	1400	1800	2000	2800	3400	3600
Price Iron Tubes	$ 95	$ 99	$ 105	$ 123	$ 135	$ 180	$ 205	$ 270	$ 340	$ 390
Price Copper Tubes	142	162	180	224	255	380	465	640	840	1015

GOUBERT FEED WATER HEATERS.

VERTICAL PATTERN.



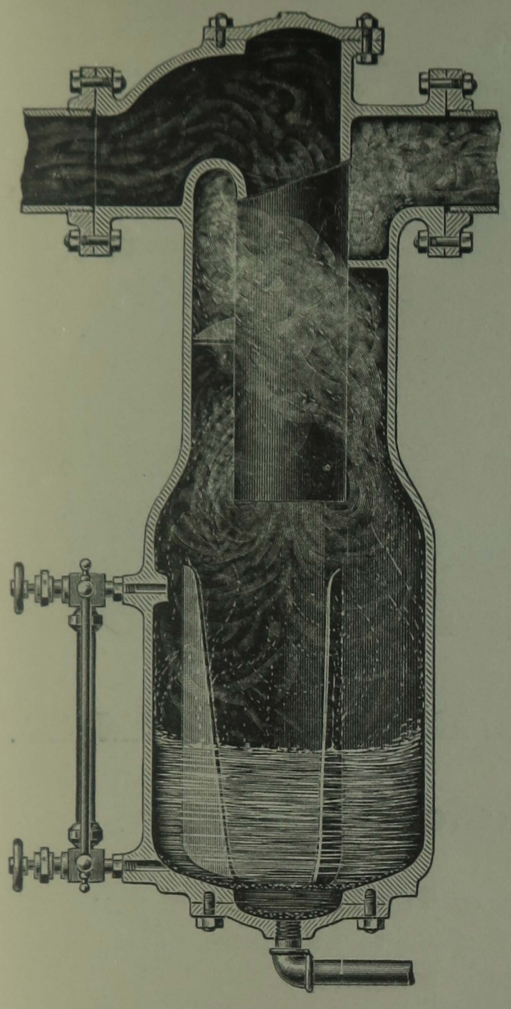
THE GOUBERT FEED WATER HEATER.
(Vertical Type.)

LIST.

No.	Horse Power.	Diameter of Shell. Ins.	Total Height on Legs. Ft.	Total Height on Legs. In.	Diameter of Exhaust. Ins.	Feed Pipe. Ins.	Approxi'ate Shipping Weight. Lbs.	Price, f. o. b. New York.
1	50	12	5	4	6	1½	825	.....
2	60	12	5	11	6	1½	850	.....
3	70	12	6	6	6	1½	900	.....
4	80	12	7	0	6	1½	950	.....
5	100	12	8	2	6	1½	1000	.....
6	130	16	6	4	8	2	1350	.....
7	160	16	7	2	8	2	1450	.....
8	200	16	8	4	8	2	1600	.....
9	240	16	9	5	8	2	1800	.....
10	300	21	8	9	10	2½	2300	.....
11	350	21	9	7	10	2½	2600	.....
12	400	21	10	5	10	2½	2900	.....
13	500	25	9	7	12	3	3800	.....
14	600	25	10	8	12	3	4000	.....
15	700	25	11	10	12	3	4400	.....
16	800	29	10	8	16	4	5000	.....
17	900	29	11	7	16	4	5500	.....
18	1000	29	12	4	16	4	5800	.....
19	1200	29	14	0	16	4	6300	.....
20	1500	34	14	4	18	5	9500	.....
21	1800	34	16	2	18	5	11500	.....
22	2000	39	13	8	22	6	13500	.....
23	2500	39	15	11	22	6	16000	.....
24	3000	48	14	3	24	6	20000	.....
25	3500	48	15	9	24	6	25000	.....
26	4000	48	17	3	24	6	27000	.....
27	5000	64	16	8	30	8	35000	.....
28	6000	64	18	9	30	8	40000	.....

Flanges are furnished for exhaust connections on all sizes from Nos. 1 to 15 inclusive.
For all larger sizes no Flanges are furnished.
All other Fittings or Valves ordered will be charged at cost.
We can furnish this Heater horizontal when desired.

PRICES ON APPLICATION.



THE STRATTON SEPARATORS.

A POSITIVE SAFEGUARD.

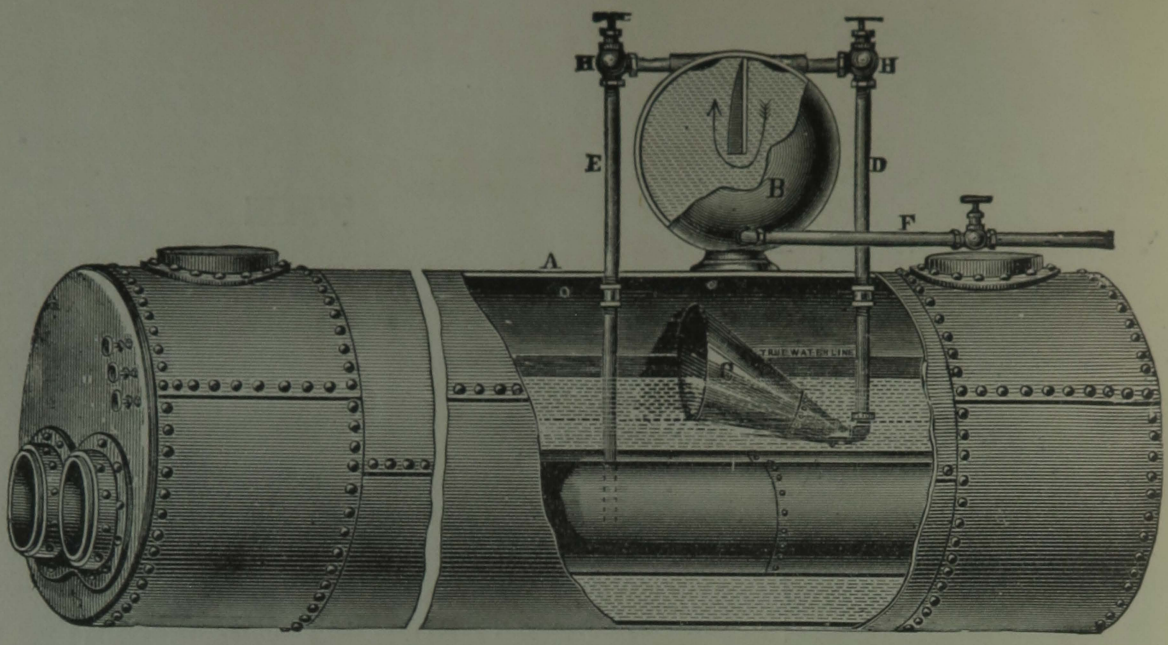
We also make Separators with Top or Bottom Outlet. Prices for these on Application.

Every Separator is tested to 180 pounds pressure; safe working pressure, 125 pounds. Special prices will be named on application for Extra Heavy Separators for higher pressures.

The Stratton Separator removes all water in the steam and delivers absolutely dry steam to your engine.

LIST "A."—Cast Iron.

Diameter of Steam Pipe. Ins.	Largest Diameter of Body. Ins.	Total Height Over All. Ins.	Size of Drip. Ins.	Distance Across Nozzles. Ins.	Distance Between Flanges. Ins.	Outside Diameter Flanges. Ins.	Approximate Shipping Weights. Lbs.	Prices F. O. B. New York.	
								Screwed Ends.	Flanged Ends.
1	5¼	17	¾	6¼	....	....	35	$12 00	.....
1½	6½	21	¾	7¼	....	....	53	20 00	....
2	7¾	25½	1	8⅜	....	....	80	30 00	.....
2½	9⅛	30	1	11	....	....	150	40 00	.....
3	11	34	1¼	....	13¾	8½	220	.....	58 00
3½	12½	38	1¼	....	15½	9	300	.....	72 00
4	14⅜	41¾	1¼	....	16⅞	10	415	.....	87 00
4½	15⅝	45 13/16	1¼	....	18½	10½	500	.....	104 00
5	17⅛	49 13/16	1¼	....	20	11	600	.....	126 00
6	20	57⅝	1½	....	22¾	13	1,025	.....	160 00
7	21⅝	65⅞	1½	....	28	14	1,350	.....	200 00
8	23⅝	74	1½	....	31	15	1,850	.....	240 00



THE HOTCHKISS MECHANICAL BOILER CLEANER.

DIRECTIONS FOR ATTACHING THE HOTCHKISS CLEANER.

The most important points for perfect working of THE HOTCHKISS MECHANICAL BOILER CLEANER are in the careful adjustment of its parts, and its proper attachment to the boiler, The following directions are to be exactly complied with :

1st. In all boilers place the Up flow pipe *D*, which has the Funnel attached, as far back on the boiler as possible, (the end furthest from the fire), always avoiding the seams and brace rivets. Usually the Funnel will set in and among the braces.

2d. Be sure and have bottom of Funnel at least as low as low-water level in boiler. If you ever carry water as low as lower cock, then set Funnel on line with it; if never below middle cock, then about one inch below it. In any event four to six inches of water must be carried solid in Funnel. If you carry more than that, you will not be getting surface water and scum; on the contrary, when water is below opening of Funnel, and steam can enter up-flow pipe *D*, the circulation of water ceases. The Blow-off Valve on Pipe *F* should never be placed on top of boiler, but always at hand.

3d. Make all joints inside the boiler perfectly steam tight; a slight leak of steam to pipe or joints inside the boiler would prevent circulation of the water.

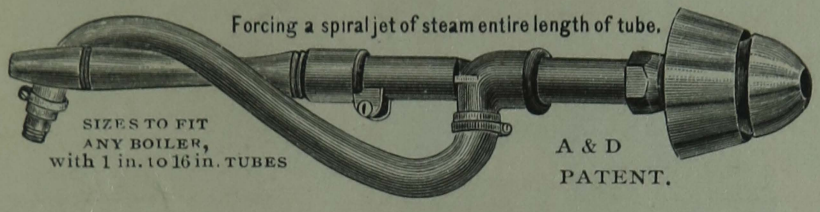
4th. Make the joints in Up-flow and Return Pipes that screw into boiler shell $1\frac{1}{4}$ inches long, so as to provide good hold for coupling underneath, and screw coupling close up to the boiler shell.

5th. Be sure that the Return Pipe *E* drops at least two inches below the lower edge of Funnel, or as much lower as flues and tubes will allow; in all cases where possible have it come to about 8 inches from bottom of the boiler.

Any steam-fitter or engineer with helper, by carefully following these directions, can apply the Cleaner to a steam boiler in from 6 to 10 hours' time, according to the surroundings.

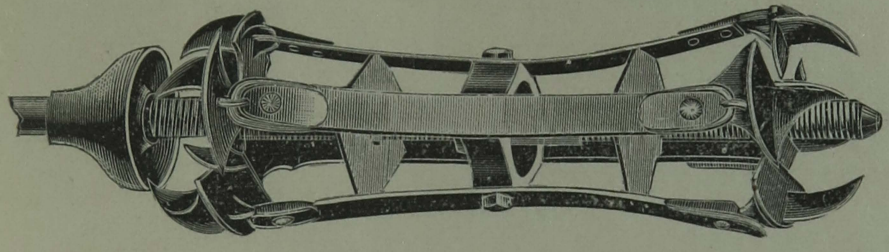
PRICES ON APPLICATION.

FLUE CLEANERS.



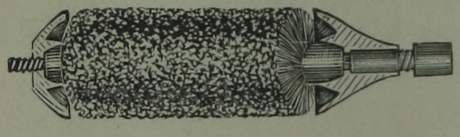
"CLEVELAND" STEAM TUBE CLEANER.

Takes Tubes.....inches,	1 to 1¾	1¾ to 2½	2¾ to 3¼	3½ to 4	4½ to 8	8½ to 16
Size Hose required.....inches,	½	¾	¾	1	1 to 1¼	1¼
Price, without Hose .....each,	$7 00	8 00	9 00	10 00	12 00	15 00



"THE ENGINEERS' FAVORITE."

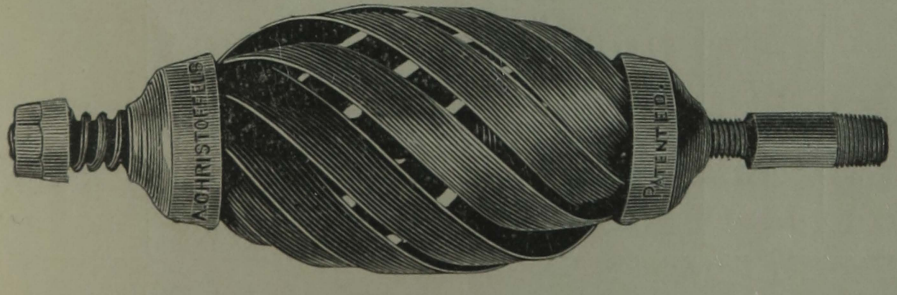
Size.....inches,	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	4	4½	5	6
Price .....each,	$2 00	2 00	2 00	2 25	2 50	2 75	3 00	3 25	3 50	4 00	4 50	6 25	7 50



"ABRAMS" EXPANDING WIRE FLUE BRUSH.

All the working parts are of steel. Can be adjusted so as to fit exactly the inside of the tube.

Size.....inches,	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	4	4½	5	5½
Price .....each,	$2 00	2 00	2 00	2 25	2 50	2 75	3 00	3 25	3 50	4 00	4 50	5 00	5 50

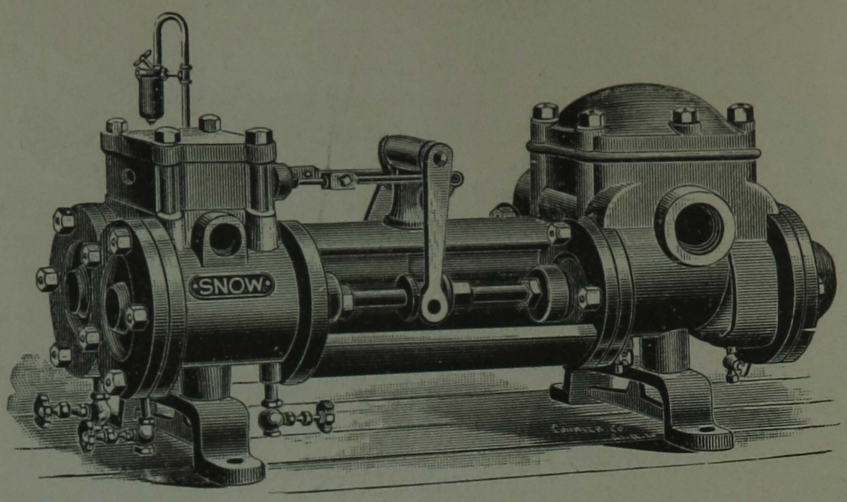


CHRISTOFFEL'S PATENT ELIPTICAL SCRAPER.

Size.....inches,	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4
Price.....each,	$2 00	2 00	2 00	2 00	2 00	2 25	2 50	2 75	3 00	3 25	3 50	3 75	4 00

SPIRAL WIRE FLUE BRUSHES.

Price, per inch in diameter.....$1 00



THE SNOW "DUPLEX BOILER-FEED" PUMPS.

OF SMALL SIZE.

The cut represents our standard design for Duplex Boiler-feed Pumps of smaller sizes. They are intended for all service when the requirements do not exceed a working pressure of 150 lbs. per square inch. These pumps are fitted with two double-acting plungers or packed pistons, rubber valves, brass seats, guards and springs, suitable for pumping hot or cold water.

Metal valves can be furnished to suit any particular requirement. In comparing the capacities of pumps, it should be borne in mind that the Snow Pump has *two* plungers and is therefore double the capacity of a single cylinder pump of the same dimensions.

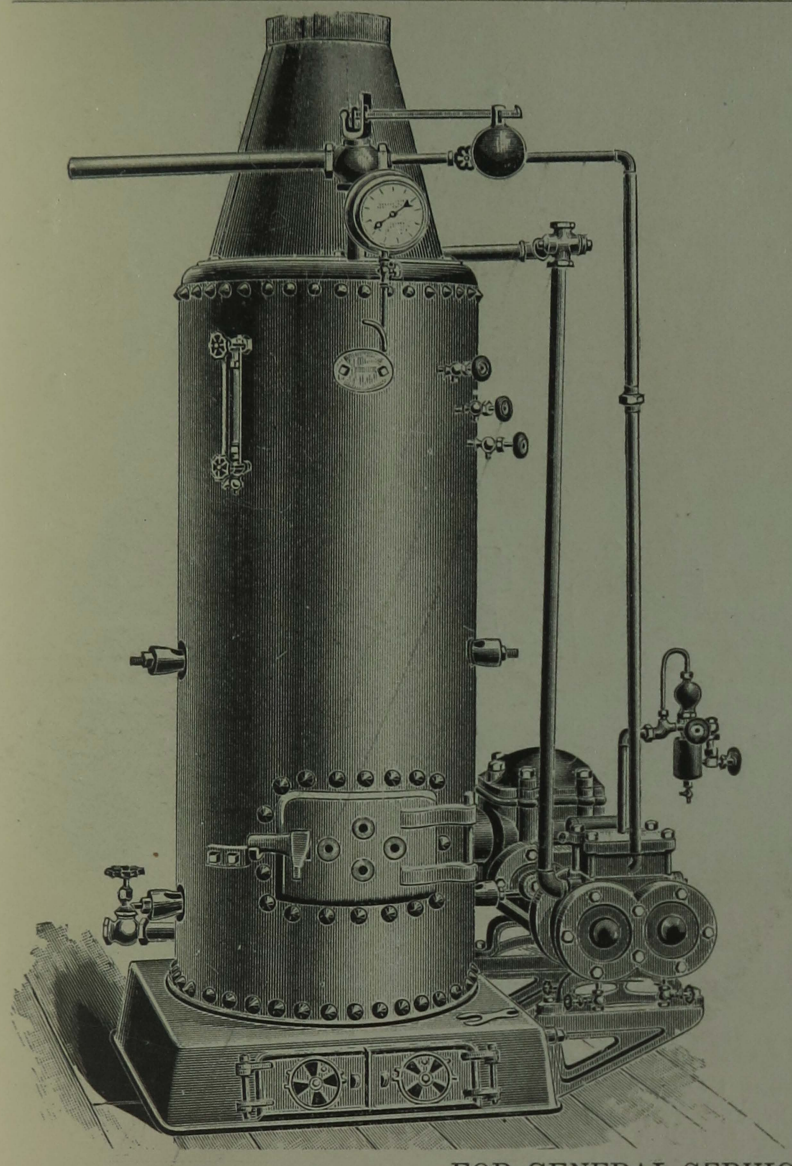
Diameter of Steam Cylinders. Inches.	Diameter of Pump Plungers. Inches.	Length of Stroke. Inches.	Gallons per Revolution.	Proper Number of Revolutions per Minute.	Gallons per Minute.	Diameter of Plunger required in any Single Cylinder Pump to do the same work at same speed. Inches.	Diameters of Pipes in Inches.			
							Steam.	Exhaust.	Suction.	Discharge.
2½	1½	2	.0579	80 to 150	4.6 to 8.7	2⅛	¼	⅜	1	¾
3	2	3	.157	50 to 125	7.8 to 19.6	2⅞	⅜	½	1¼	1
4½	2¾	4	.393	50 to 100	19.6 to 39.3	4	½	1	2	1½
5¼	3½	5	.805	50 to 90	40. to 72.	5	¾	1¼	2½	2
6	4	6	1.26	50 to 80	63. to 101.	5⅝	1	1½	3	2

Sizes are designated by the diameter of the steam cylinders, the diameter of the pump plungers and the length of stroke.

Bed Plates extra. When pumps are fitted with brass plungers and piston rods, a slight extra charge is made.

NOTE.—One revolution means one complete circuit of the motion of any of the reciprocating parts, and for a duplex pump is equivalent to four single strokes.

PRICES ON APPLICATION.



THE SNOW STEAM PUMPS AND BOILERS.

This Combination Steam Pump and Boiler is intended for use where a complete pumping plant is in demand.

The most approved form of portable boiler with the Snow Steam Pump provides a pumping station for railroads, quarries, residences, etc.

Where the water is forced not more than 75 feet, the low-service pump may be used. When this is done, an "end feed" attachment is connected to one of the water cylinders, thereby enabling the pump to feed its own boiler.

This pumping plant is complete in every detail, and is built as simple and strong as possible.

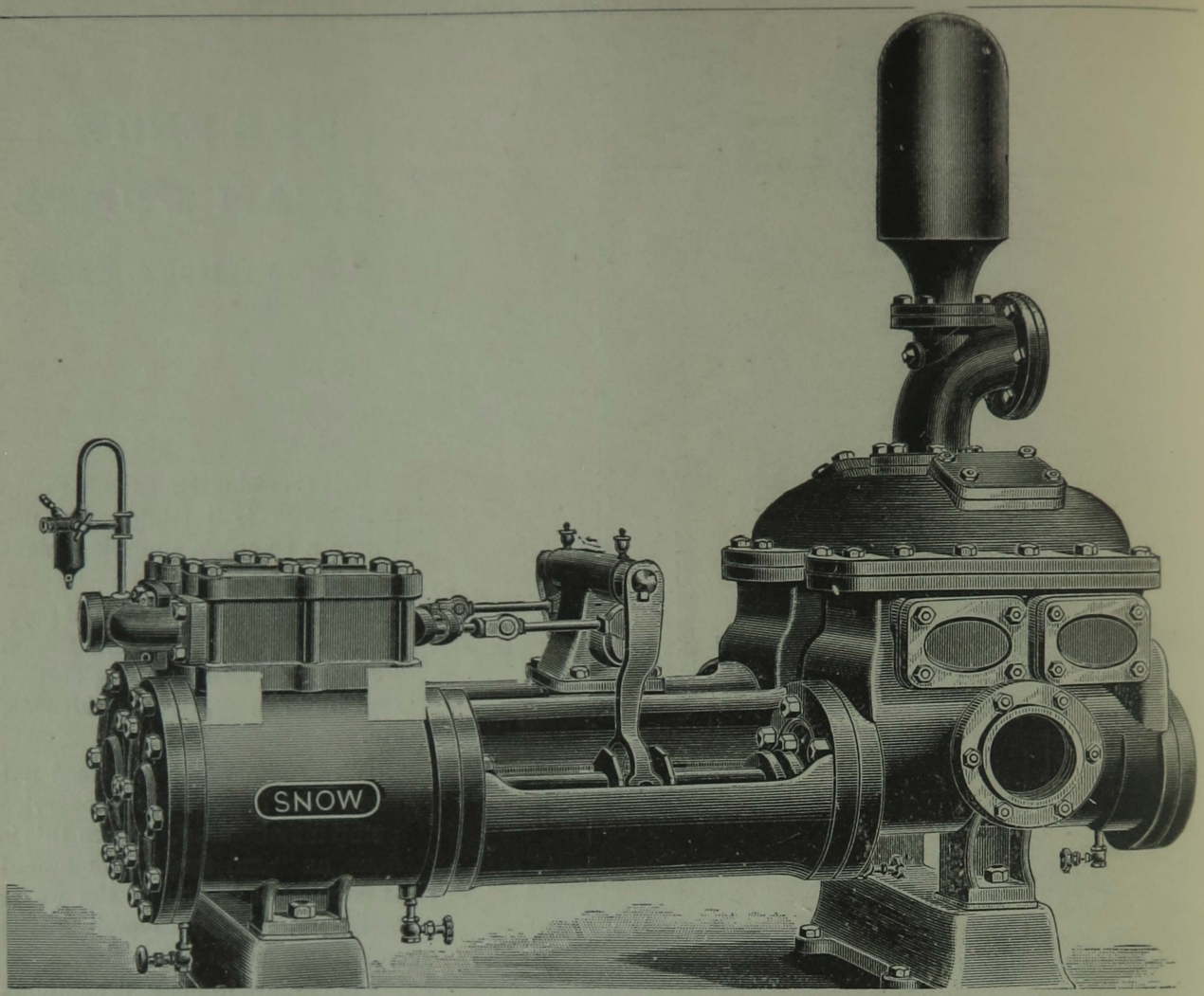
FOR GENERAL SERVICE.

Diameter of Steam Cylinders. Inches.	Diameter of Pump Plungers. Inches.	Length of Stroke. Inches.	Proper Number of Revolutions per Minute.	Gallons per Minute.	Dimensions of Boilers.				Diameters of Pipes in Inches.			
					Diam. of Shell. Inches.	Height of Shell. Inches.	N'mb'r of Tubes.	Length of Tubes. Inches	Steam.	Exhaust.	Suction.	Discharge.
3	2	3	50 to 125	7 8 to 19.6	24	48	31	24	⅜	½	1¼	1
4½	2¾	4	50 to 100	19.6 to 39.3	24	60	31	36	½	1	2	1½
5¼	3½	5	50 to 90	40. to 72.	30	60	55	33	¾	1¼	2½	2
6	4	6	50 to 80	63. to 101.	30	72	55	45	1	1½	3	2
7	4½	8	45 to 70	95. to 144.	36	84	77	57	1¼	2	4	3
8	5	10	40 to 65	130. to 211.	42	90	100	60	1½	2	5	4
10	6	10	40 to 65	188. to 305.					2	2½	5	4

FOR "LOW SERVICE" OR TANK PUMPS.

Diameter of Steam Cylinders. Inches.	Diameter of Pump Plungers. Inches.	Length of Stroke. Inches.	Proper Number of Revolutions per Minute.	Gallons per Minute.	Dimensions of Boilers.				Diameters of Pipes in Inches.			
					Diam. of Shell. Inches.	Height of Shell. Inches.	N'mb'r of Tubes.	Length of Tubes. Inches.	Steam.	Exhaust.	Suction.	Discharge.
4½	3¾	4	50 to 100	37 to 75	24	60	31	36	½	1	2½	2
5¼	4¾	5	50 to 90	75 to 136	30	60	55	33	¾	1¼	3	2½
6	5¾	6	50 to 80	133 to 212	30	72	55	45	1	1½	4	3
7	6¾	8	45 to 70	218 to 340	36	84	77	57	1¼	2	5	4
8	6	10	40 to 65	188 to 305	42	87	109	60	1½	2	5	4
8	7	10	40 to 65	258 to 419	42	87	109	60	1½	2	6	5

PRICES ON APPLICATION.

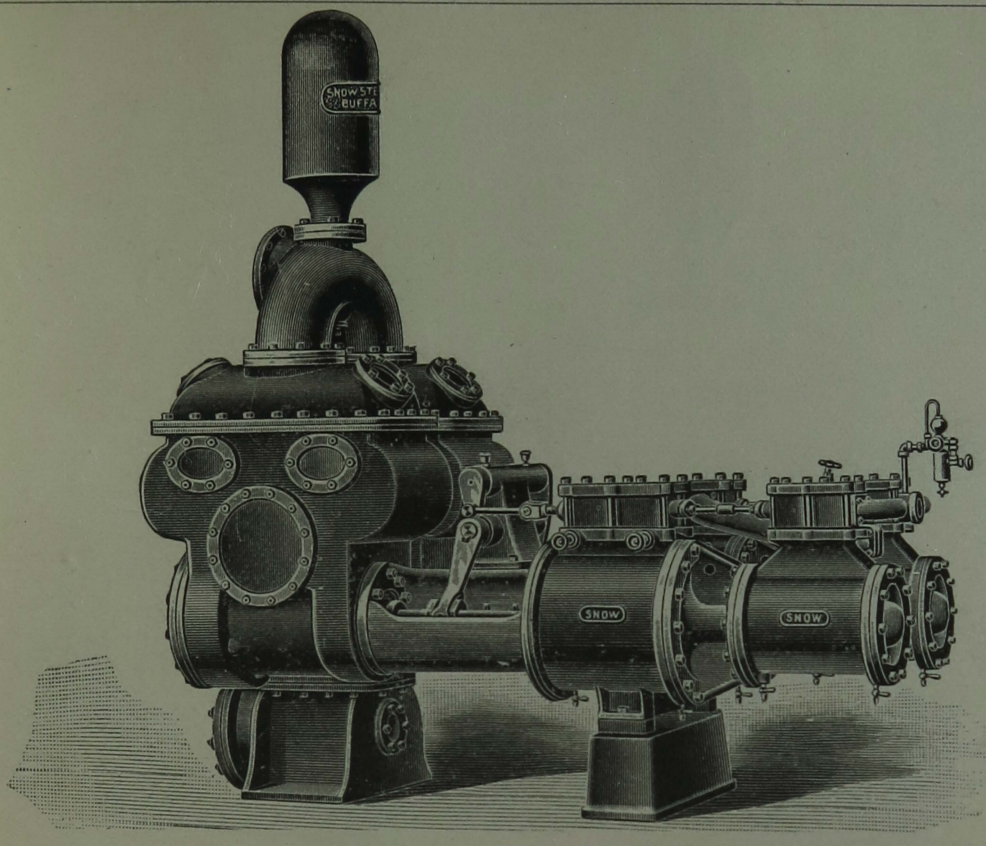


THE SNOW "PISTON-PATTERN" PUMPS.

This pump differs in construction from the Plunger and Ring form in that the water cylinder is provided with a piston packed with fibrous packing. The pump cylinders are provided with a removable lining.

Diameter of Steam Cylinders. Inches.	Diameter of Pump Pistons. Inches.	Length of Stroke. Inches.	Gallons per Revolution.	Proper Number of Revolutions per Minute.	Gallons per Minute.	Diameters of Pipes in Inches.			
						Steam.	Exhaust.	Suction.	Delivery.
8	6	12	5.63	35 to 60	197 to 338	1½	2	5	4
10	6	12	5.63	35 to 60	197 to 338	2	2½	5	4
12	6	12	5.63	35 to 60	197 to 338	2½	3	5	4
8	7	12	7.75	35 to 60	271 to 465	1½	2	6	5
10	7	12	7.75	35 to 60	271 to 465	2	2½	6	5
12	7	12	7.75	35 to 60	271 to 465	2½	3	6	5
14	7	12	7.75	35 to 60	271 to 465	2½	3	6	5
10	8½	12	11.5	35 to 60	402 to 690	2	2½	8	6
12	8½	12	11.5	35 to 60	402 to 690	2½	3	8	6
14	8½	12	11.5	35 to 60	402 to 690	2½	3	8	6
16	8½	12	11.5	35 to 60	402 to 690	3	4	8	6
12	10	12	16.	35 to 60	560 to 960	2½	3	8	7
14	10	12	16.	35 to 60	560 to 960	2½	3	8	7
16	10	12	16.	35 to 60	560 to 960	3	4	8	7
18	10	12	16.	35 to 60	560 to 960	3	4	8	7
20	10	12	16.	35 to 60	560 to 960	4	5	8	7
14	12	12	23.1	35 to 60	808 to 1386	2½	3	10	8
16	12	12	23.1	35 to 60	808 to 1386	3	4	10	8
18	12	12	23.1	35 to 60	808 to 1386	3	4	10	8
20	12	12	23.1	35 to 60	808 to 1386	4	5	10	8
16	14	12	31.5	35 to 60	1102 to 1890	3	4	12	10
18	14	12	31.5	35 to 60	1102 to 1890	3	4	12	10
20	14	12	31.5	35 to 60	1102 to 1890	4	5	12	10

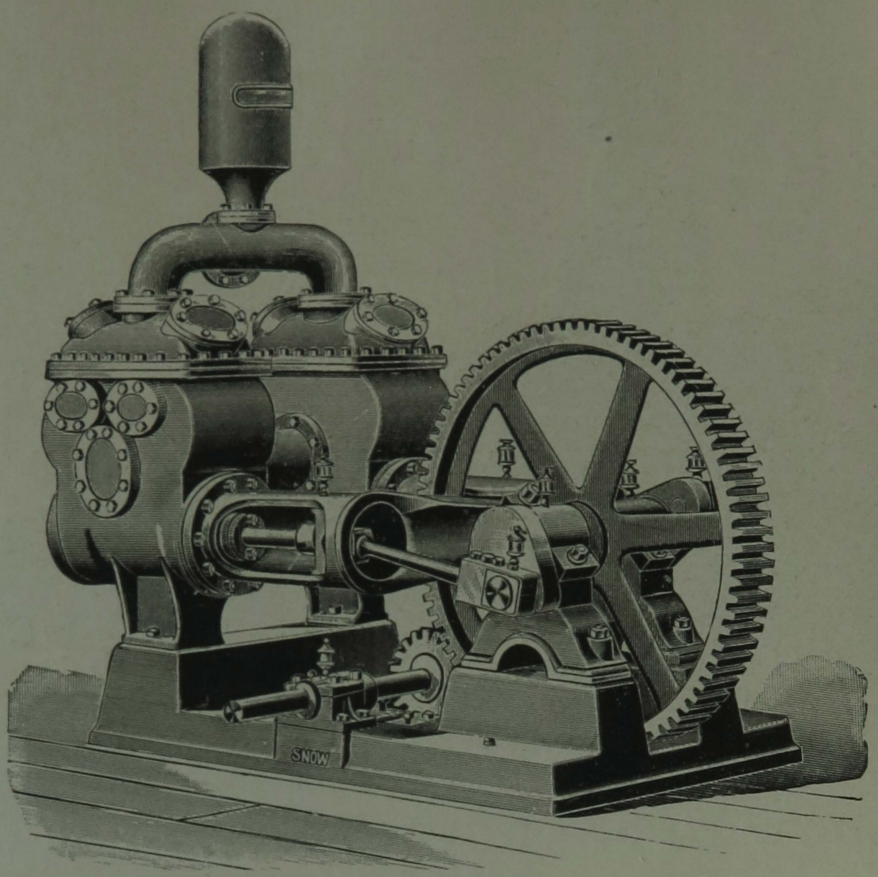
PRICES ON APPLICATION.



THE SNOW "COMPOUND PISTON-PATTERN" PUMPS.

Sizes are designated by the diameter of the steam cylinders, the diameter of the pump pistons and the length of stroke. When pumps are fitted with brass pistons and piston rods a slight additional charge is made. An extra charge will also be made for bed plates.

Diameter of Steam Cylinders. Inches.	Diameter of Pump Pistons. Inches.	Length of Stroke. Inches.	Displacement in Gallons per Revolution.	Proper Number of Revolutions per Minute.	Gallons per Minute.	Diameters of Pipes in Inches.			
						Steam.	Exhaust.	Suction.	Delivery
8 and 12	5	12	3.9	35 to 60	136 to 234	1½	3	5	4
8 " 12	6	12	5.63	35 to 60	197 to 338	1½	3	5	4
8 " 12	7	12	7.7	35 to 60	269 to 462	1½	3	6	5
9 " 16	7	12	7.7	35 to 60	269 to 462	2	4	6	5
10 " 16	7	12	7.7	35 to 60	269 to 462	2	4	6	5
10 " 18	7	12	7.7	35 to 60	269 to 462	2	4	6	5
12 " 18	7	12	7.7	35 to 60	269 to 462	2½	4	6	5
9 " 16	8½	12	11.5	35 to 60	402 to 690	2	4	8	6
10 " 16	8½	12	11.5	35 to 60	402 to 690	2	4	8	6
10 " 18	8½	12	11.5	35 to 60	402 to 690	2	4	8	6
12 " 18	8½	12	11.5	35 to 60	402 to 690	2½	4	8	6
12 " 20	8½	12	11.5	35 to 60	402 to 690	2½	5	8	6
14 " 20	8½	12	11.5	35 to 60	402 to 690	2½	5	8	6
10 " 16	10	12	16.	35 to 60	560 to 960	2	4	8	7
10 " 18	10	12	16.	35 to 60	560 to 960	2	4	8	7
12 " 18	10	12	16.	35 to 60	560 to 960	2½	4	8	7
12 " 20	10	12	16.	35 to 60	560 to 960	2½	5	8	7
14 " 20	10	12	16.	35 to 60	560 to 960	2½	5	8	7
14 " 22	10	12	16.	35 to 60	560 to 960	2½	6	8	7
12 " 18	12	12	23.1	35 to 60	808 to 1386	2½	4	10	8
12 " 20	12	12	23.1	35 to 60	808 to 1386	2½	5	10	8
14 " 20	12	12	23.1	35 to 60	808 to 1386	2½	5	10	8
14 " 22	12	12	23.1	35 to 60	808 to 1386	2½	6	10	8
16 " 22	12	12	23.1	35 to 60	808 to 1386	3	6	10	8
14 " 20	14	12	31.5	35 to 60	1102 to 1890	2½	5	12	10
14 " 22	14	12	31.5	35 to 60	1102 to 1890	2½	6	12	10
16 " 22	14	12	31.5	35 to 60	1102 to 1890	3	6	12	10
16 " 26	14	12	31.5	35 to 60	1102 to 1890	3	7	12	10
18 " 26	14	12	31.5	35 to 60	1102 to 1890	3	7	12	10
10 " 16	10	16	21.2	30 to 50	636 to 1060	2	4	8	7
10 " 18	10	16	21.2	30 to 50	636 to 1060	2	4	8	7
12 " 18	10	16	21.2	30 to 50	636 to 1060	2½	4	8	7
12 " 20	10	16	21.2	30 to 50	636 to 1060	2½	5	8	7
14 " 20	10	16	21.2	30 to 50	636 to 1060	2½	5	8	7
12 " 18	12	16	30.7	30 to 50	921 to 1535	2½	4	10	8
12 " 20	12	16	30.7	30 to 50	921 to 1535	2½	5	10	8
14 " 20	12	16	30.7	30 to 50	921 to 1535	2½	5	10	8
14 " 20	14	16	42.	30 to 50	1260 to 2100	2½	5	12	10



THE SNOW "POWER" PUMPS.

Owing to the shocks and concussions, having no elastic cushion such as the steam end of the regular duplex pattern provides, it is necessary that they be met by especiallly heavy driving parts and a reduced piston speed. The gears, etc., are consequently built in a most substantial manner, and are intended either to be driven by the jack shaft from a turbine or by a belt from the line shaft. The water end is similar to the regular Duplex Pump, thereby making it possible to apply the power gear to any particular service.

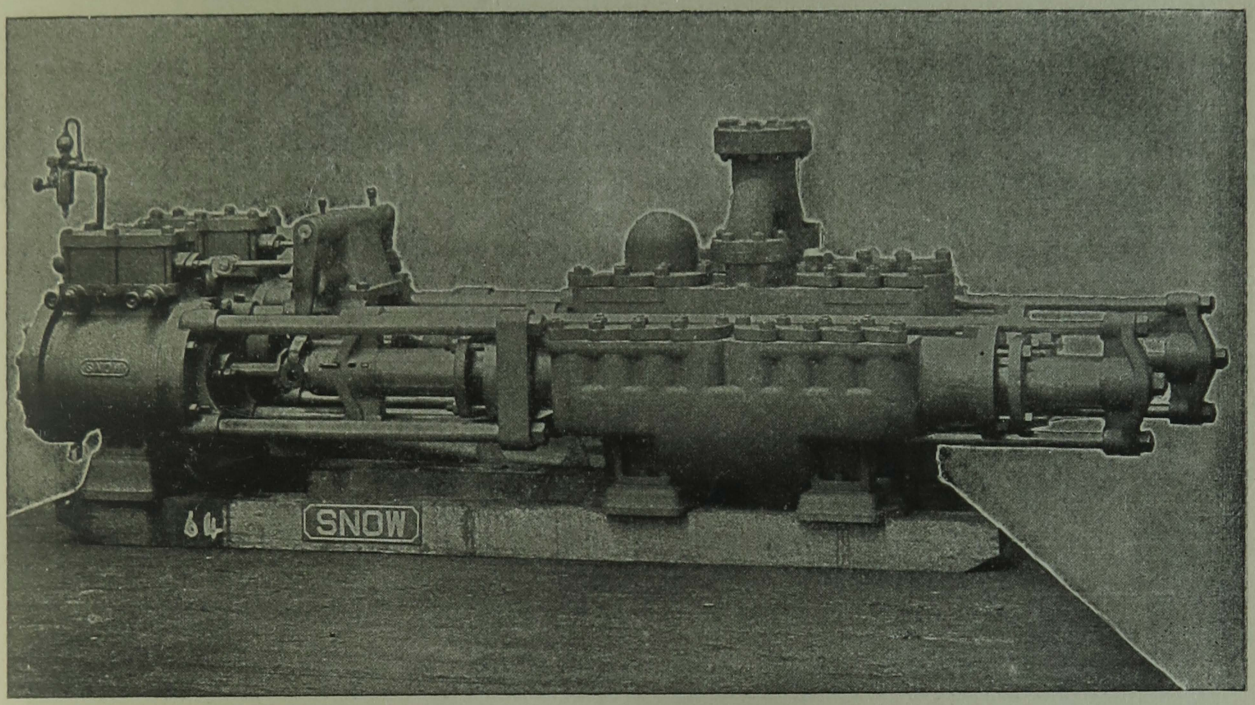
Diameter of Pump Pistons. Inches.	Length of Stroke. Inches.	Gallons per Revolution.	Proper Number of Revolutions per Minute.	Gallons per Minute.	Diameter of Suction Pipe. Inches.	Diameter of DischargePipe Inches.
4	6½	1.36	35 to 50	47 to 68	3	2
4½	8½	2.24	30 to 45	67 to 100	4	3
5	10½	3.41	25 to 40	85 to 136	5	4
6	10½	4 93	25 to 40	123 to 197	5	4
7	12½	8 07	20 to 35	161 to 282	6	5
8½	12½	11.95	20 to 35	239 to 418	8	5
10	12½	16.63	20 to 35	332 to 582	8	7
12	12½	24.05	20 to 35	481 to 841	10	8
14	12½	32.84	20 to 35	656 to 1149	12	10
14	18	47 3	15 to 30	709 to 1419	12	10
16	18	60.74	15 to 30	911 to 1822	14	12

Sizes are designated by the diameter of the pump pistons and the length of stroke.

When pumps are fitted with brass pistons and rods a slight additional charge is made.

Any number of combinations, in addition to the above list, can be furnished to meet the requirements of any particular service.

PRICES ON APPLICATION.

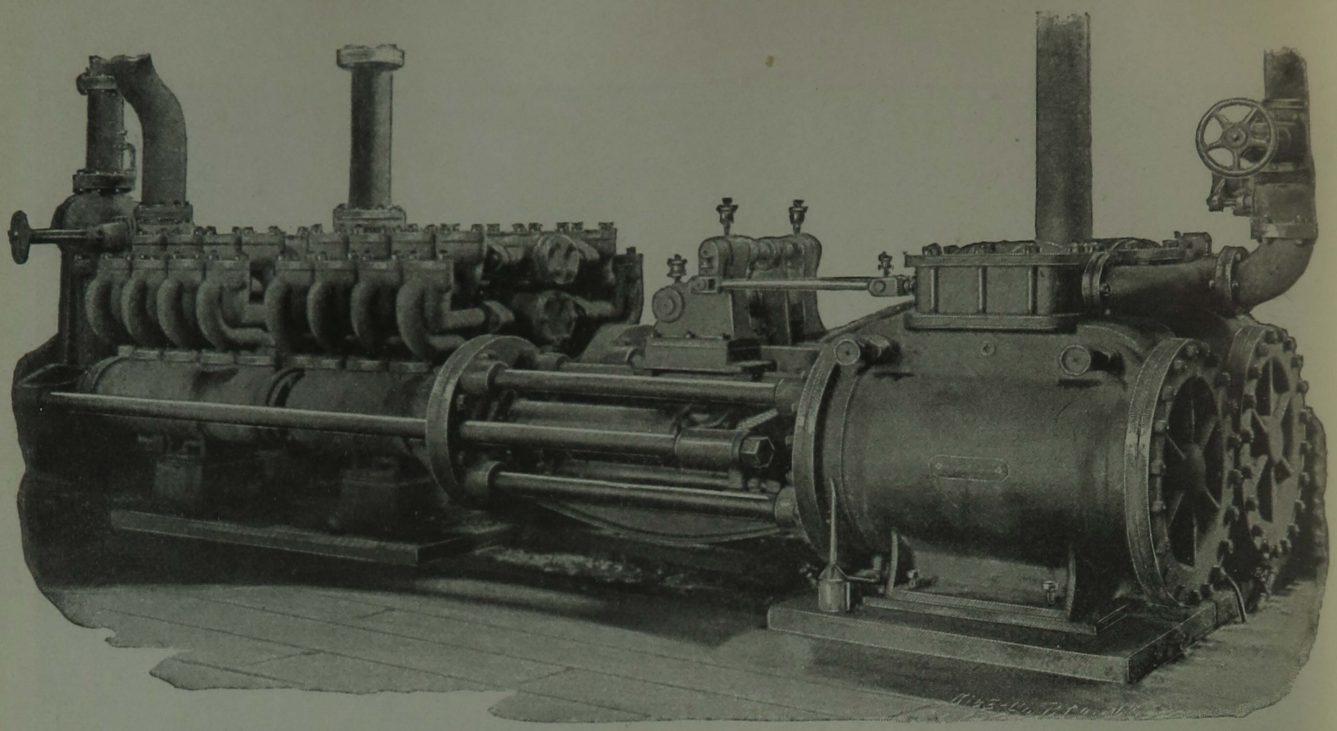


THE SNOW IMPROVED DUPLEX PLUNGER PUMPS.

SOLID WATER CHEST PATTERN.

These pumps are adapted for mines or other service where it is required to pump against heavy pressure. They have four "outside packed" plungers of hard cast iron or bronze, as the conditions may require. The plungers are carried by strong cross-heads, connected by steel tie rods, and these work in long, babbited bearings, which take the weight of the plungers and keep them centrally in their stuffing boxes. The stuffing boxes are all made deep. The water barrels and water chests are in one casting. The water valves are of the "wing" type, of gun metal, faced with leather or rubber as required. More than usual area of valve and water passage is provided. As this style of pump is somewhat lower than the "Pot Valve" style, they can be used with advantage where there is little head room. The whole water end will be made of gun metal when the conditions so require.

LIST OF SIZES SEE NEXT PAGE. OTHER SIZES TO ORDER.



THE SNOW "MINE" PUMPS.

WITH OUTSIDE PACKED PLUNGERS.

The exterior stuffing boxes found on the Pressure Pump are used in this pattern, possessing the great advantage of being in full sight, so that any leak may at once be detected.

These engines may be compounded when a greater economy is desired.

Diameter of Steam Cylinders. Inches.	Diameter of Pump Plungers. Inches.	Length of Stroke. Inches.	Gallons per Revolut'n.	Proper Number of Revolutions per Minute.	Gallons per Minute.	Pump Pressure in Lbs. per Square Inch.	Diameters of Pipes in Inches.			
							Steam.	Exhaust.	Suction.	Discharge.
10	4	10	2 17	40 to 65	87 to 141	470	2	2½	4	3
10	5	10	3 4	40 to 65	136 to 221	300	2	2½	5	4
12	4	12	2 6	35 to 60	91 to 156	675	2½	3	4	3
14	4	12	2.6	35 to 60	91 to 156	915	2½	3	4	3
16	4	12	2.6	35 to 60	91 to 156	1200	3	4	4	3
12	5	12	4.08	35 to 60	143 to 245	435	2½	3	5	4
14	5	12	4.08	35 to 60	143 to 245	590	2½	3	5	4
16	5	12	4.08	35 to 60	143 to 245	770	3	4	5	4
18	5	12	4 08	35 to 60	143 to 245	980	3	4	5	4
20	5	12	4 08	35 to 60	143 to 245	1200	4	5	5	4
12	6	12	5.88	35 to 60	206 to 353	300	2½	3	5	4
14	6	12	5.88	35 to 60	206 to 353	410	2½	3	5	4
16	6	12	5 88	35 to 60	206 to 353	530	3	4	5	4
18	6	12	5.88	35 to 60	206 to 353	675	3	4	5	4
20	6	12	5.88	35 to 60	206 to 353	830	4	5	5	4
14	7	12	8.	35 to 60	280 to 480	300	2½	3	6	5
16	7	12	8.	35 to 60	280 to 480	395	3	4	6	5
18	7	12	8.	35 to 60	280 to 480	495	3	4	6	5
20	7	12	8.	35 to 60	280 to 480	610	4	5	6	5
16	8	12	10 4	35 to 60	364 to 624	300	3	4	6	5
18	8	12	10.4	35 to 60	364 to 624	380	3	4	6	5
20	8	12	10.4	35 to 60	364 to 624	470	4	5	6	5

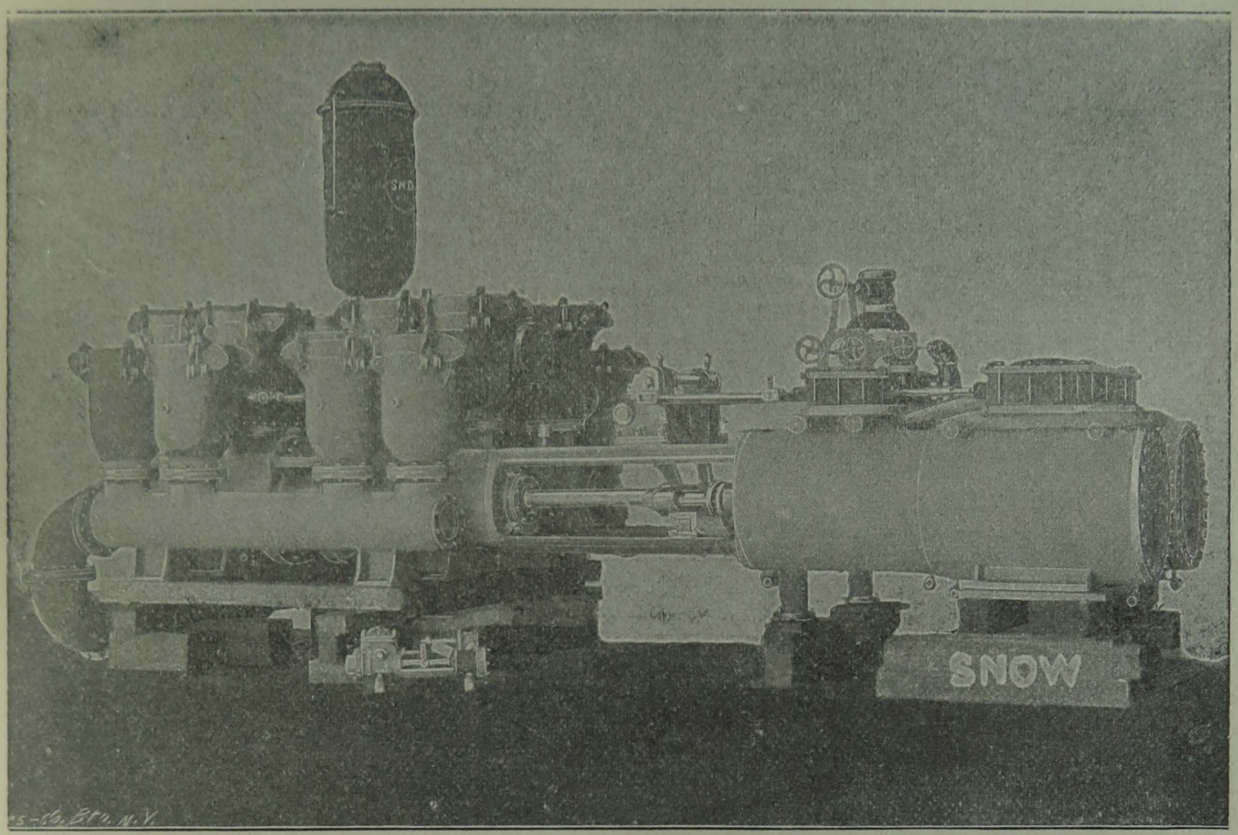
When pumps are fitted with brass plungers and piston rods a slight additional charge is made. An extra charge is made for bed plates.

Any number of combinations in addition to the above list can be furnished to meet the requirements of any particular service.

These pumps can be run at a much higher speed, thus enabling them to handle larger quantities of fluid than given in above table.

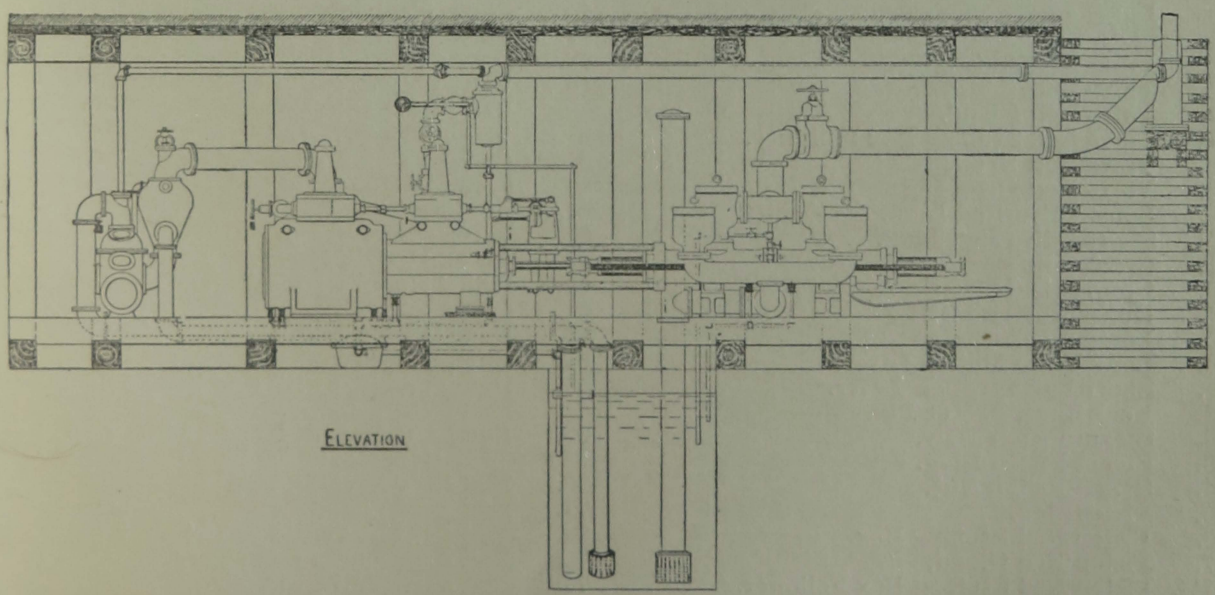
NOTE.—One revolution means four strokes. Pump pressure in table is based on a pressure of 100 pounds in steam cylinders.

PRICES ON APPLICATION.



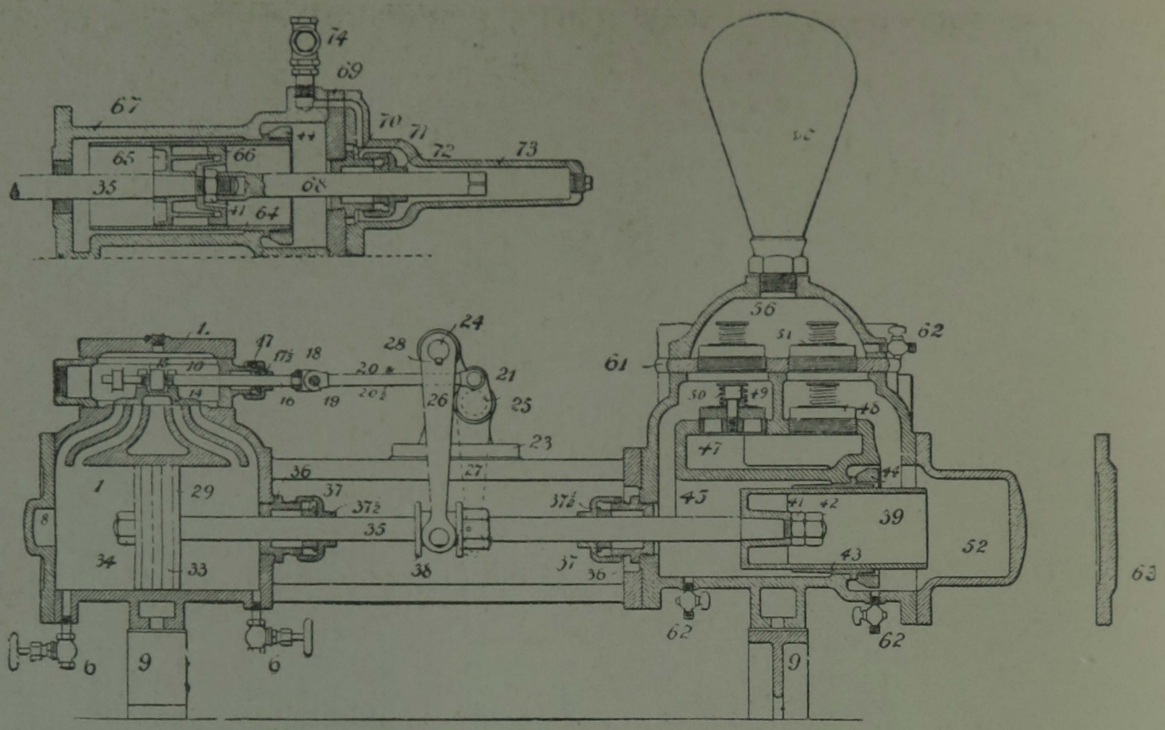
COMPOUND CONDENSING MINING PUMPS.

PATENT VALVE PATTERN.



PUMPING STATION IN A MINE.

PRICES ON APPLICATION.



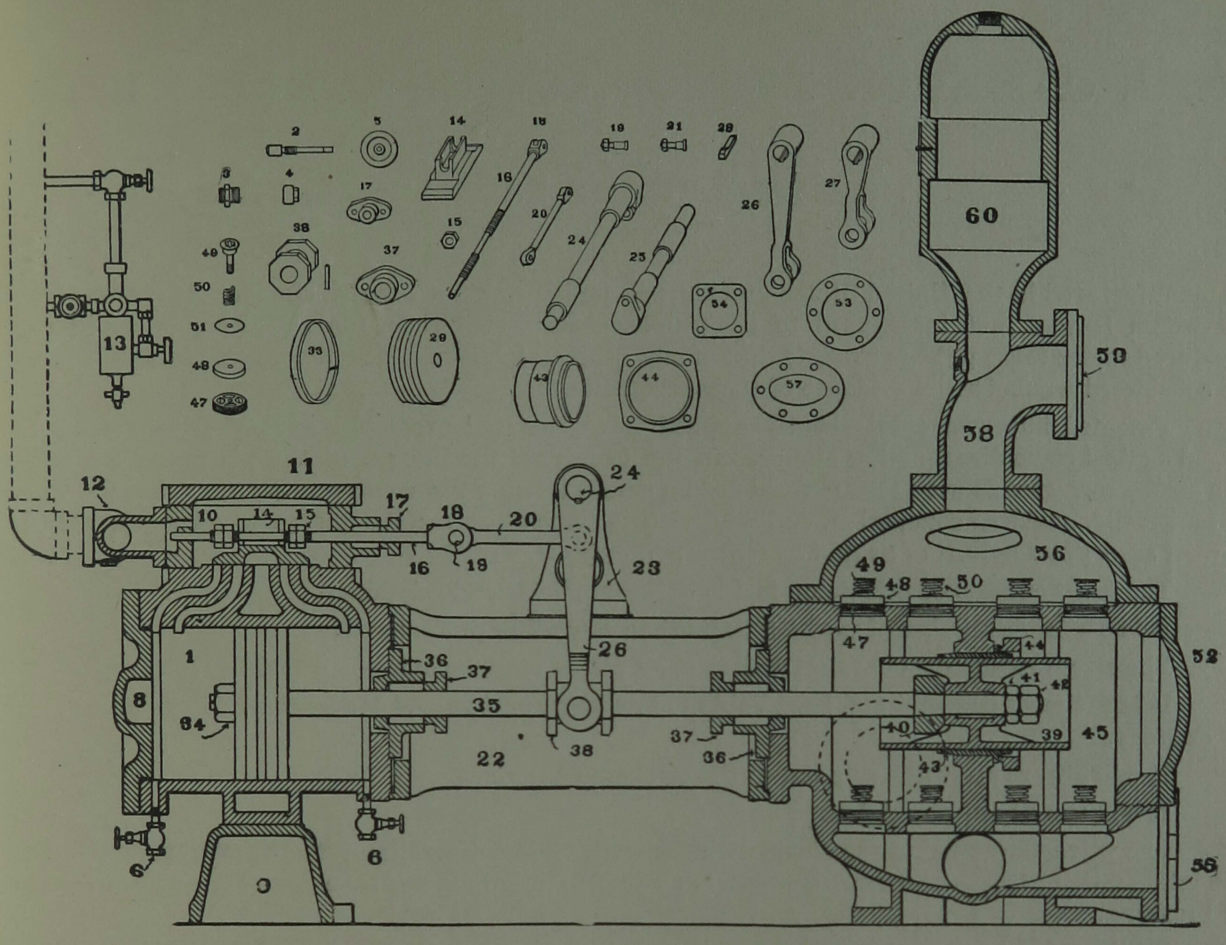
THE PARTS OF THE SNOW STEAM PUMP

OF SMALLER SIZES.

1. Steam Cylinder.
6. Blow Globe Valve.
8. Steam Cylinder Head.
9. Foot.
10. Steam Chest.
11. Steam Chest Cover.
13. Lubricator.
14. Slide Valve.
15. Valve Rod Nut.
16. Valve Rod.
17. Valve Rod Gland.
17½. Valve Rod Stuffing Box Follower.
18. Valve Rod Head.
19. Valve Rod Head Pin.
20. Long Valve Rod Link.
20½. Short Valve Rod Link.
21. Crank Pin.
23. Cross Stand.
24. Upper Rock Shaft.
25. Lower Rock Shaft.
26. Long Valve Motion Lever.
27. Short Valve Motion Lever.
28. Rock Shaft Key or Pin.
29. Steam Piston Body.
33. Steam Piston Ring.
34. Steam Piston Nut.
35. Piston Rod.
36. Piston Rod Stuffing Box.
37. Piston Rod Gland.
37½. Piston Rod Stuffing Box Follower.
38. Spool and Pin.
39. Plunger.
41. Plunger Jam Nut.
42. Plunger Nut.
43. Plunger Ring.
44. Binder.
45. Pump Cylinder.
47. Valve Seat.
48. Pump Valve.
49. Valve Guard.
50. Valve Spring.
51. Valve Washer.
52. Plunger Pump Cylinder Head.
56. Force Chamber.
60. Air Chamber.
61. Valve Plate.
62. Air and Drain Cocks.
63. Piston Pump Cylinder Head.
64. Piston Sleeve.
65. Pump Piston Body.
66. Pump Piston Follower.
67. Pump Cylinder with End Feed Attachment.
68. End Feed Plunger.
69. Pump Cylinder Head with End Feed Attachment.
70. End Feed Stuffing Box.
71. End Feed Gland.
72. End Feed Stuffing Box Follower.
73. End Feed Pump Barrel.
74. End Feed Valve Chamber.

In ordering parts by wire, give shop number of pump and number of part wanted.

See Next Page for Larger Pumps.



THE PARTS OF THE SNOW STEAM PUMP

OF LARGER SIZES.

1. Steam Cylinder, Nos. 1 and 2.
2. Dash Relief Valve.
3. Dash Relief Valve Stuffing Box.
4. Dash Relief Valve Gland.
5. Dash Relief Valve Hand Wheel.
6. Blow Globe Valve.
7. Exhaust Screw Flange.
8. Steam Cylinder Head.
9. Steam Cylinder Foot.
10. Steam Chest.
11. Steam Chest Cover.
12. Steam Pipe.
13. Lubricator.
14. Slide Valve.
15. Valve Rod Nut.
16. Valve Rod.
17. Valve Rod Gland.
18. Valve Rod Head.
19. Valve Rod Head Pin.
20. Long Valve Rod Link.
20½. Short Valve Rod Link.
21. Crank Pin.
22. Cradle.
23. Cross Stand.
24. Upper Rock Shaft.
25. Lower Rock Shaft.
26. Long Valve Motion Lever.
27. Short Valve Motion Lever.
28. Rock Shaft Key.
29. Steam Piston Body.
33. Steam Piston Ring.
34. Steam Piston Nut.
35. Piston Rod.
36. Piston Rod Stuffing Box.
37. Piston Rod Gland.
38. Spool and Pin.
39. Plunger.
40. Plunger Collar.
41. Plunger Jam Nut.
42. Plunger Nut.
43. Plunger Ring.
44. Binder.
45. Pump Cylinder.
46.
47. Valve Seat.
48. Valve.
49. Valve Guard.
50. Valve Spring.
51. Valve Washer.
52. Pump Cylinder Head.
53. Pump Cylinder Hand Hole Plate.
54. Suction Chamber Hand Hole Plate.
55. Suction Screw Flange.
56. Force Chamber.
57. Force Chamber Hand Hole Plate.
58. Delivery Tee.
59. Delivery Screw Flange.
60. Air Chamber.

In ordering parts by wire, give shop number of pump and number of part wanted.

THE CAMERON DIRECT-ACTING STEAM PUMP,

THE STANDARD OF EXCELLENCE,

Is manufactured in the United States and Europe under patents granted to Mr. A. S. Cameron, by whom it was first introduced to the public, since which time the number of steam pumps produced under these patents exceeds that of any other establishment in the business, which should be considered a substantial evidence of their excellence.

Patented improvements recently applied have removed every objection that experience has urged against some direct-acting pumps. In the Cameron, the motion of the pistons at the end of the stroke corresponds with that derived from a crank, turning the centers softly, allowing the valves to seat easily, avoiding concussion, and rendering it impossible for the piston to strike the cylinder covers, *even when traveling as fast as steam will drive it.*

The great success of this pump is due to its simplicity and reliability.

It has a fewer number of working parts than any other pump made.

The steam mechanism consists of four stout pieces only, including the main slide valve.

It is the most compact and least liable to breakage, as *none of the working parts are exposed to damage.*

It will always start at any point of the stroke.

It will run at any speed desired.

The valve movement of the steam cylinder working in a direct line with the main piston without the intervention of arms or levers, enables the pump to be run faster than any other without danger of breaking.

While under a full pressure of steam the suction pipe can be lifted out of the water without danger of the piston striking the ends. This is a condition hitherto never approached in this class of machines. The advantage is apparent, for a pump may be running along on a regular duty under a full pressure of steam, and the supply of water be suddenly cut off.

Every pump can be taken apart without disconnecting the pipes.

The parts of the water cylinder are so arranged that they cannot possibly become deranged; there are no valve bolts nor screws to become loose; the whole interior of the valve chest is exposed by simply removing one bonnet, and the water valves can be taken out and replaced almost instantly.

They are stronger and heavier for capacity than any pump made.

Every pump is thoroughly tested before it leaves the works, and guaranteed to give perfect satisfaction or the price will be refunded.

In comparing Price List with that of others, the actual sizes of cylinders and lengths of stroke should be considered, and not the numbers indicating the size of the pumps.

PRICES OF PUMPS OF ANY SIZE OR PROPORTION OF CYLINDERS NOT FOUND IN THESE PAGES, FURNISHED ON APPLICATION.

The pump is thus described by the "American Artisan":

"This pump is remarkable for its compactness and simplicity—its parts are few, strong and very plain. The operation is such that there is not an atom of steam used beyond what is necessary to move it. There is no 'dead center' to the pump—it will start at any point. The pump cylinder is fitted with a piston and four valves of generous proportions. The interior of the cylinder is so arranged as to dispense entirely with 'channel ways,' 'ports' or 'passages.' *By removing one bonnet the whole interior is exposed—turned inside out as it were—and there is not a spot where a single speck can lodge without being detected.* The valves used are A. S. Cameron's patent, their construction being such that sand, mud, corn, cinders, etc., can pass through the pump, the valves working perfectly tight under any pressure. The machine works noiselessly. Its compactness, simplicity, strength, lightness and consequent cheapness must recommend its use in every situation where a pumping engine is required."

TO CORRESPONDENTS.

DIRECTIONS FOR ORDERING.

In ordering a pump it is for the interest of the purchaser to fully inform us on the following questions:

First. For what purpose is the pump to be used? What is the average pressure of steam?
Second. What is the liquid to be pumped? and is it hot or cold, clear or gritty, fresh, salt or acidulous?
Third. What is the maximum quantity to be pumped per hour?
Fourth. To what height is the liquid to be lifted by suction, also the height of discharge? What is the length and diameter of the suction and discharge pipes, and the number of elbows or turns?

All pumps, unless otherwise ordered, are arranged for fresh cold water. Parties ordering pumps to be used on other duty than this, will please give full particulars of the work to be done.

For pumps arranged with mountings to resist the action of bad mine water (a class of work in which we have had a large experience) an extra charge is made. When so required, the pump cylinders are made entirely of composition.

Pumps furnished to order with movable pump linings, in iron, composition, or phosphor bronze.

All the parts of the pump are interchangeable, so that in case of accident to any piece, a new one can be sent that will fit exactly.

SUCTION AND DISCHARGE OPENINGS.

Many buyers suppose the size of these openings indicates the capacity of the pump. This supposition would be in the main correct, if all manufacturers used the same proportion of pipe area to water piston area; but they do not. Where the pump list of one builder gives six inches as the diameter of suction pipe for a certain size of pump, another list gives eight inches for the same size. Obviously, if a six-inch opening is large enough, increasing it to eight inches will not give greater capacity to the pump. The size of the pump cylinder alone indicates its capacity, and to that dimension the buyer should look when making comparison between different pump lists.

DIRECTIONS FOR CONNECTING AND RUNNING PUMPS.

Never use pipes of less diameter than given in the tables. In long pipes this should be increased to allow for increased friction, especially in *suction pipes*.

Use as few bends and valves as possible, and run every pipe in as direct a line as practicable and where convenient use full round bends rather than elbows. Valves, returns and elbows increase friction more rapidly than length of pipe, and no pump can work satisfactorily that does not have a full supply of water.

Pumps should always be drained in cold weather, as freezing of water in pipes or cylinders is sure to burst them. Engineers should therefore be careful and open the drip plugs and cocks—which are provided on all pumps for draining them.

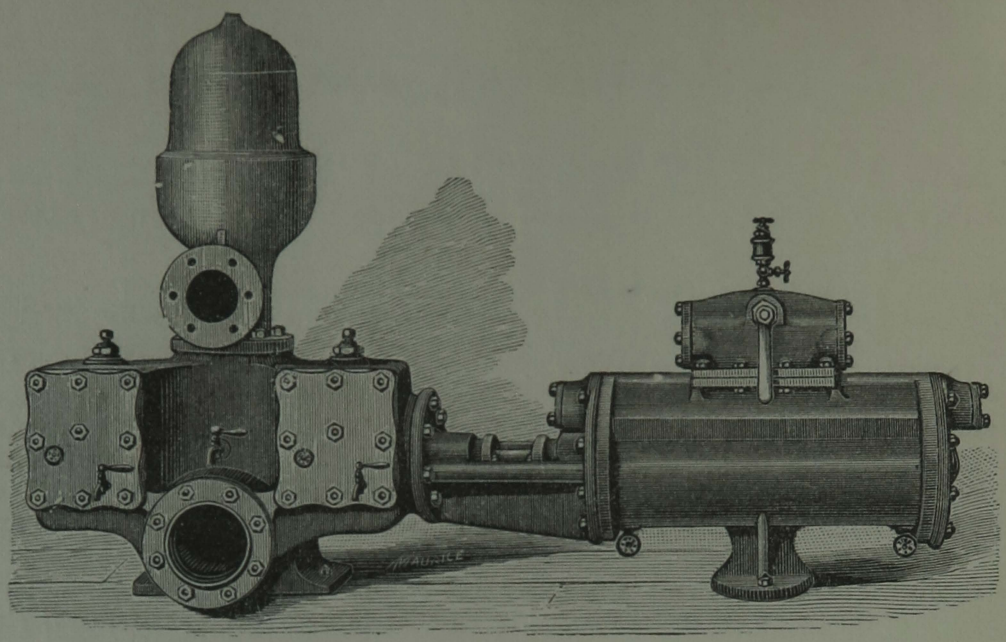
Water at high temperature cannot be raised any considerable distance by suction, as the vapor discharged from the water so heated follows the receding pistons of the pump and resists the entrance of the water; consequently, to pump hot water, always place the supply above the pump, so that it will be supplied from a head.

A vacuum chamber upon the suction pipe, close to the pump, is always an advantage, and on long lines of pipe or on pumps running at a high rate of speed, is *absolutely necessary*. Their utility consists in causing a steady and uniform flow of the fluid through the suction pipe, and thus preventing "pounding" or water hammering, which (without one) is always incident to long suction.

When working under very heavy duty, put a petcock in the suction pipe close to the pump between the vacuum chamber (should there be one) and the pump, and by admitting a small quantity of air keep the air chamber supplied, and the surplus air passing with the water through the discharge pipe, converts the otherwise solid body of water into an elastic column, preventing water hammering and consequent shock on the pump and pipes.

Do not use tallow in the steam cylinder, but a little of the best refined mineral, sperm or lard oil. Any oil that corrodes or gums the working parts is unfit for use.

Ordinary speed to run pumps is not over 100 feet piston travel per minute. For continuous boiler-feeding service about half that speed is recommended.

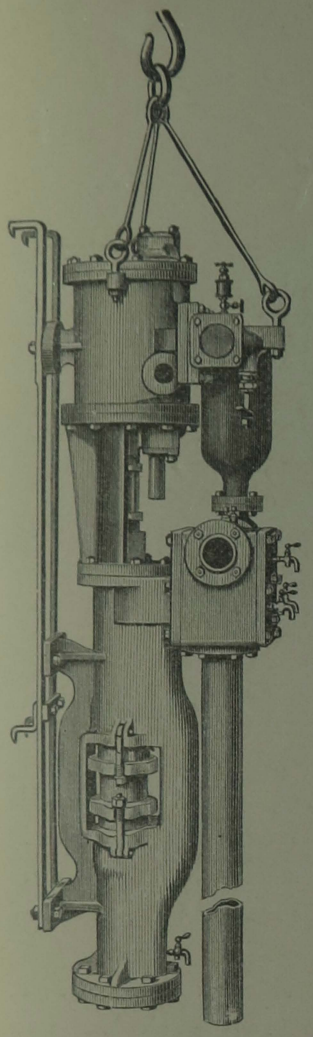


THE CAMERON STEAM PUMPS.

REGULAR PATTERNS.

For boiler feed or general pumping service. Arranged for pumping hot or cold water.

Numbers.	Diameter of Steam Cylinder. Inches.	Diameter of Pump Cylinder. Inches	Stroke of Piston. Inches.	Capacity per Stroke in Gallons.	Capacity at ordinary Speed per Minute.	Boilers in Horse Power they will supply.	Steam Pipe. Inches.	Exhaust Pipe. Inches.	Suction Pipe. Inches.	Discharge Pipe. Inches.	Length Over All. Feet and Inches.	Height Over All. Feet and Inches.	Width Over All. Feet and Inches.	Price with Iron Pump Cylinder and Piston Rod.	Price, with Pump Lining, Piston and Piston Rod of Composition.
0	3½	2	4	.054	8	25	⅜	½	1¼	1	2 8	1.6	.9	$ 80	$ 85
1	4	2	6	081	12	40	⅜	½	1¼	1	3.4	1.6	.10	120	125
2	5	2½	6	.12	20	60	½	¾	1½	1¼	3.4	1.9	.11	140	150
3	6	3	7	.21	28	100	¾	1	2	1½	3.11	2 4	1.1	165	175
3a	6	3½	7	.29	38	140	¾	1	2½	2	3.11	2.4	1.3	185	200
4	7	3½	7	.29	38	140	¾	1	2½	2	3.11	2 4	1.3	210	225
4a	7	4	7	.39	50	250	¾	1	2½	2	4.3	2.5	1.4	235	250
5	7	3½	12	.5	50	...	1	1½	3	2½	4 10	3.1	1.5	275	290
5b	7	5	13	1.10	100	...	1	1½	4	3	5.3	3.7	1.8	325	350
6	8	4	12	.65	65	...	1	1½	3	2½	4 10	3 1	1.6	325	340
6a	8	5	13	1.10	100	...	1	1½	4	3	5.3	3.7	1.8	350	375
7	10	5	13	1.10	100	...	1¼	2	4	3	5 4	3 7	1 9	375	400
8	10	6	13	1.58	150	...	1¼	2	4	3½	5.4	3 9	1.9	400	425
9	12	7	13	2.16	200	...	1½	2½	5	4	5.6	4.5	2.	470	500
10a	14	8	13	2.83	261	...	2	3	5	5	6 1	4 6	2 2	540	575
10	14	9	18	4.96	325	...	2	3	6	5	6.9	5.3	2 6	...	...
11	16	10½	18	6.75	450	...	2½	4	8	6	7 6	6.4	3.1	...	..
12	18	12	20	9.80	587	...	3	4	10	8	8.7	6.10	3.5	...	...



THE CAMERON PATENT VERTICAL MINING PUMPS.

FOR SINKING AND RECOVERING SHAFTS.

DOUBLE PLUNGER PATTERN.

This improved form of vertical sinking pump will commend itself to every one requiring a pump of this description. While heavier than the piston pattern, it possesses the advantage over other makes of sinking pumps, of admitting of tightening the packing around the plunger while the pump is at work, or to repack it without disturbing any of the connections. A base plate can be attached to the bottom of the pump cylinder and the pump used for general purposes after work in the shaft is completed.

Numbers.	Weight. Pounds.	Steam Cylinder. Inches.	Plunger. Inches.	Stroke in Inches.	Capacity per St'k in Gallons.	Steam Pipe. Inches.	Exhaust Pipe. Inches.	Suction Pipe. Inches.	Discharge Pipe. Inches.	Price.
5	1280	7	3½	12	.5	1	1½	2½	2	$ 350
6	1350	8	4	12	.65	1	1½	3	2½	400
7	2240	10	5	13	1.10	1¼	2	4	3	475
9	3079	12	7	13	2 16	1½	2½	5	4	575
9A	3127	12	6	13	1.58	1½	2½	5	4	575
9B	3709	14	7	13	2 16	2	3	5	4	650
10	4205	14	8	13	2.93	2	3	6	5	728
11	5153	16	8	16	3 48	2½	4	6	5	800
12	5776	18	9	16	4.4	3	4	6	5	1000

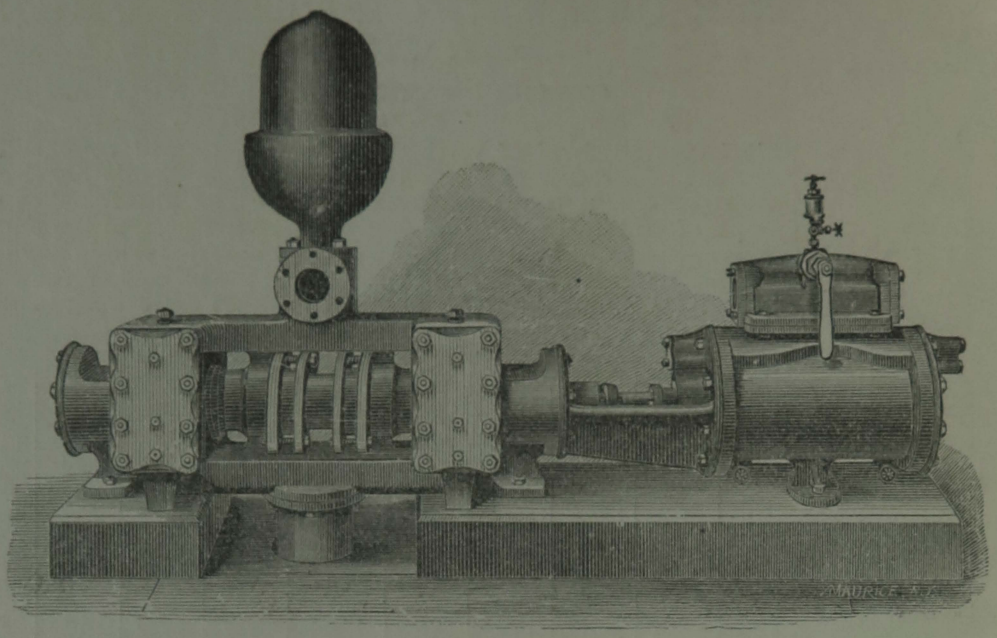
Prices on larger sizes or other combinations furnished on application.

THE CAMERON LIGHT-SERVICE PUMPS.

FOR FILLING TANKS AND LIGHT DUTY GENERALLY.

These pumps are employed at locomotive water stations, in manufactories, or situations where it is required to lift a considerable quantity of water to a limited elevation.

Numbers.	Diameter of Steam Cylinder. Inches.	Diameter of Water Cylinder. Inches.	Stroke. Inches.	Gallons Discharged per Stroke.	Capacity at Ordinary Speed per Minute. Gallons.	Steam Pipe. Inches.	Exhaust Pipe. Inches.	Suction Pipe. Inches.	Delivery Pipe. Inches.	Price, Iron Cylinder.	Price, with Pump Lining, Piston and Piston Rod of Composition.
A	4	3½	7	.29	38	⅜	½	2½	2	$135	$150
B	5	5	7	1.17	100	½	¾	3	2½	235	250
C	7	7	13	2.00	200	1	1½	5	4	375	400
D	7	8	13	2.61	260	1	1½	5	4	400	425
E	8	10	18	6.12	400	1	1½	6	5	.....	.....
F	10	12	20	9 80	575	1¼	2	10	8	.....	.....
G	12	12	20	9.80	575	1½	2½	10	8	.....	.....



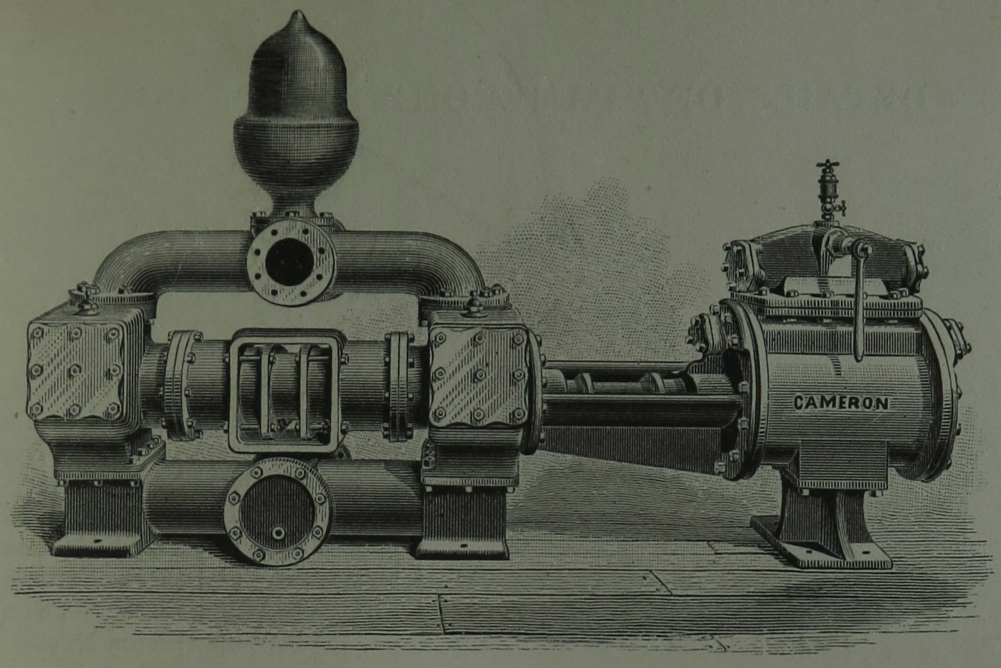
THE CAMERON DOUBLE PLUNGER PUMPS.

These pumps are especially designed for feeding boilers with hot or cold water, under heavy pressure. They are extensively used in rolling mills, blast furnaces, etc., and have entirely superseded the expensive and cumbersome fly-wheel pumps, formerly so commonly in use for that purpose. They are also adapted for pumping water mixed with sand or grit. They are more compact than any other make of plunger pumps; there are no outside connections, and the plunger resting in the stuffing boxes in the center, there is no liability of its sagging.

The valve arrangement is similar to the regular piston pump. The water valve seats are made of the best composition. Valves of material to best suit the situation. Piston rods of steel with iron plungers, or rods and plungers of best composition, as circumstances require.

LIST.

Numbers.	Diameter of Steam Cylinder. Inches.	Diameter of Plunger. Inches.	Stroke in Inches.	Capacity at Ordin'ry Speed per Minute. Gallons.	Boilers in Horse Power They Will Supply.	Steam Pipe. Inches.	Exhaust Pipe. Inches.	Suction Pipe. Inches.	Discharge Pipe. Inches.	Floor Space Required. Inches.	Price. All Iron.	Price, with Composition Piston Rod.	Price, with Composition Piston Rod and Plunger.
A	4	2	6	12	40	⅜	½	1¼	1	53 x 10	$125	$128	$150
B	6	3	7	28	100	¾	1	2	1½	59 x 13	220	225	250
B B	7	3½	7	38	140	¾	1	2	1½	60 x 15	270	275	300
C	8	4	12	65	260	1	1½	3	2½	82 x 18	375	385	425
D	10	5	13	100	400	1¼	2	4	3	91 x 23	450	460	500
E	12	6	18	150	600	1½	2½	5	4	114 x 25	....	....	....
E E	12	7	13	200	...	1½	2½	5	4	99 x 27	....	....	....
F	14	8	18	260	...	2	3	6	5	126 x 29	....	....	....
G	14	7	18	200	...	2	3	5	4	126 x 28	....	....	....
H	16	8	18	260	...	2½	4	6	5	130 x 30	....	....	....



THE CAMERON MINING PUMPS.

DOUBLE PLUNGER PATTERN.

This pump, for mining purposes, has earned for itself a world-wide reputation, and in this department we can confidently say it stands pre-eminent. Our new patterns embody all improvements that years of experience in this class of work could suggest; all parts are easily got at, the seats for the water valves are of the best composition, the openings large, and the valves easily removed; there are no valve bolts to become loose; the plunger being supported in both packing boxes cannot sag or get out of line at the ends of the stroke, and there is not a single working part exposed to damage by either carelessness or accident.

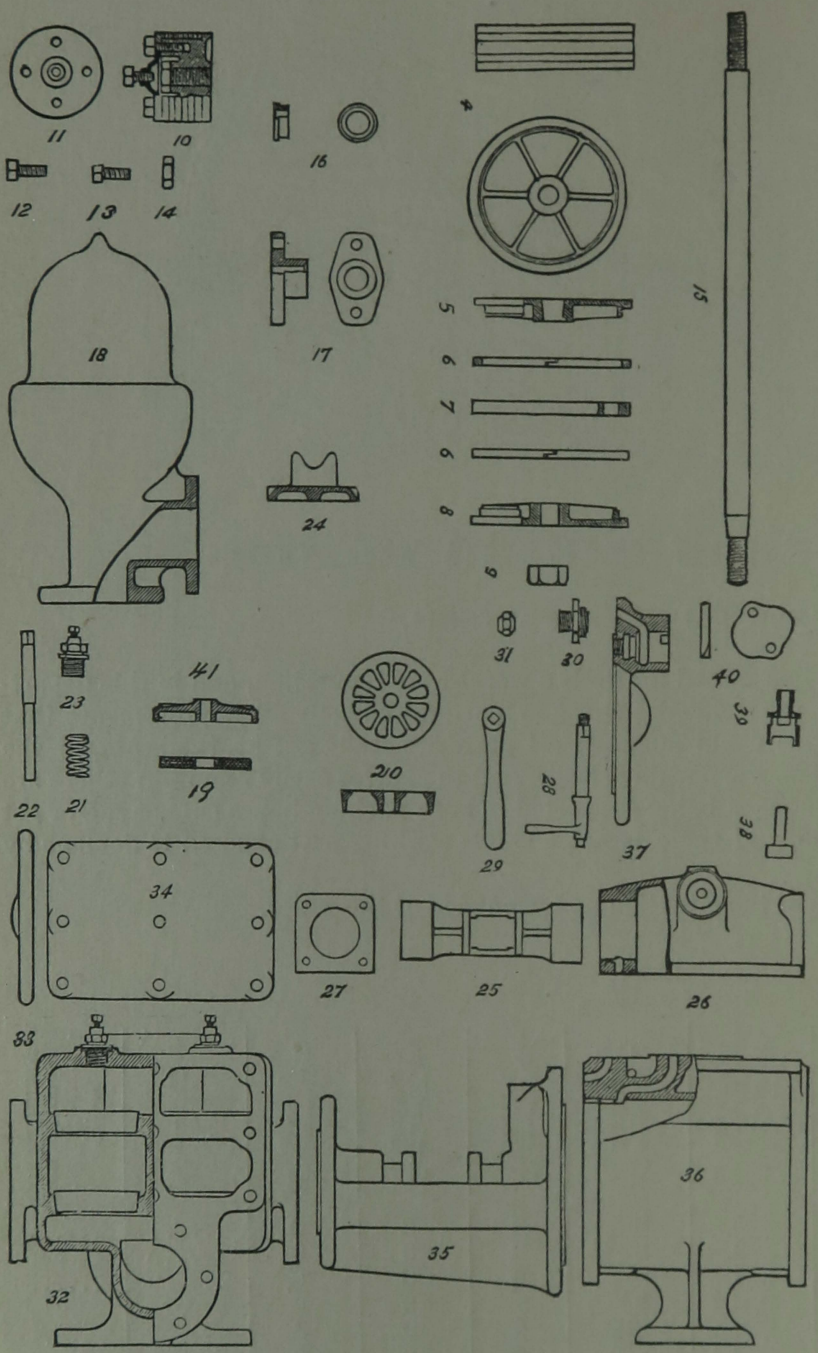
In ordering state fully particulars of the situation and condition of the water.

LIST.

Diameter of Steam Cylinder. Inches.	Diameter of Plunger. Inches.	Stroke. Inches.	Capacity per Stroke. Gallons.	Capacity per Minute at Ordinary Speed. Gallons.	Steam Pipe. Inches.	Exhaust Pipe. Inches.	Suction Pipe. Inches.	Delivery Pipe. Inches.	Price—All Iron.	Price, with Composition Piston Rods and Plungers.
14	9	18	4.96	325	2	3	8	6	.....	.....
14	9	33	9 07	350	2	3	8	6	.....	.....
16	9	33	9 07	350	2½	4	8	6	.....	.....
18	9	33	9.07	350	3	4	8	6	.....	.....
16	10½	18	6.75	400	2½	4	10	8	.....	.....
16	10½	33	12.37	450	2½	4	10	8	.....	.....
18	10½	33	12.37	450	3	4	10	8	.....	.....
20	10½	33	12.37	450	3	4	10	8	.....	.....
18	12	20	9.80	500	3	4	12	10	.....	.....
18	12	36	17.63	575	3	4	12	10	.....	.....
20	12	36	17.63	575	3	4	12	10	.....	.....
22	12	36	17.63	575	4	5	12	10	.....	.....
24	12	36	17 63	575	4	5	12	10	.....	.....
24	14	36	24.00	800	4	5	12	10	.....	.....
26	14	36	24 00	800	5	6	12	10	.....	.....
28	16	36	31 32	1000	5	6	14	12	.....	.....
30	16	36	31.32	1000	5	6	14	12	.....	.....

PRICES ON APPLICATION.

DETAILS OF "CAMERON" STEAM PUMP.



LIST OF PARTS.

4 Steam Piston, Complete.
5 Steam Piston Head.
6 Steam Piston Packing Rings.
7 Steam Piston Bull Ring.
8 Steam Piston Follower.
9 Steam Piston Nut.
10 Water Piston, Complete.
11 Water Piston Follower.
12 Water Piston Follower Bolt.
13 Water Piston Set Screw.
14 Water Piston Nut.
15 Piston Rod.
16 Piston Rod Thimble.
17 Piston Rod Gland.
18 Air Chamber.
19 Water Valve.
20 Water Valve Seat.
21 Water Valve Spring.
22 Water Valve Stem.
23 Water Valve Plug.
24 Slide Valve.
25 Steam Plunger.
26 Steam Chest.
27 Steam Chest Cover.
28 Steam Chest Crank.
29 Steam Chest Crank Handle.
30 Steam Chest Stuffing Box.
31 Steam Chest Stuffing Box Cap.
32 Water Cylinder.
33 Water Cylinder Cover.
34 Water Chest Bonnet.
35 Body.
36 Steam Cylinder.
37 Steam Cylinder Cover.
38 Reversing Valve.
39 Reversing Valve Bushing.
40 Reversing Valve Cap.
41 Water Valve Guard.

HOW TO ORDER PARTS OF PUMPS.

1st. Give size of pump, which will be found cast on valve-chest bonnet.

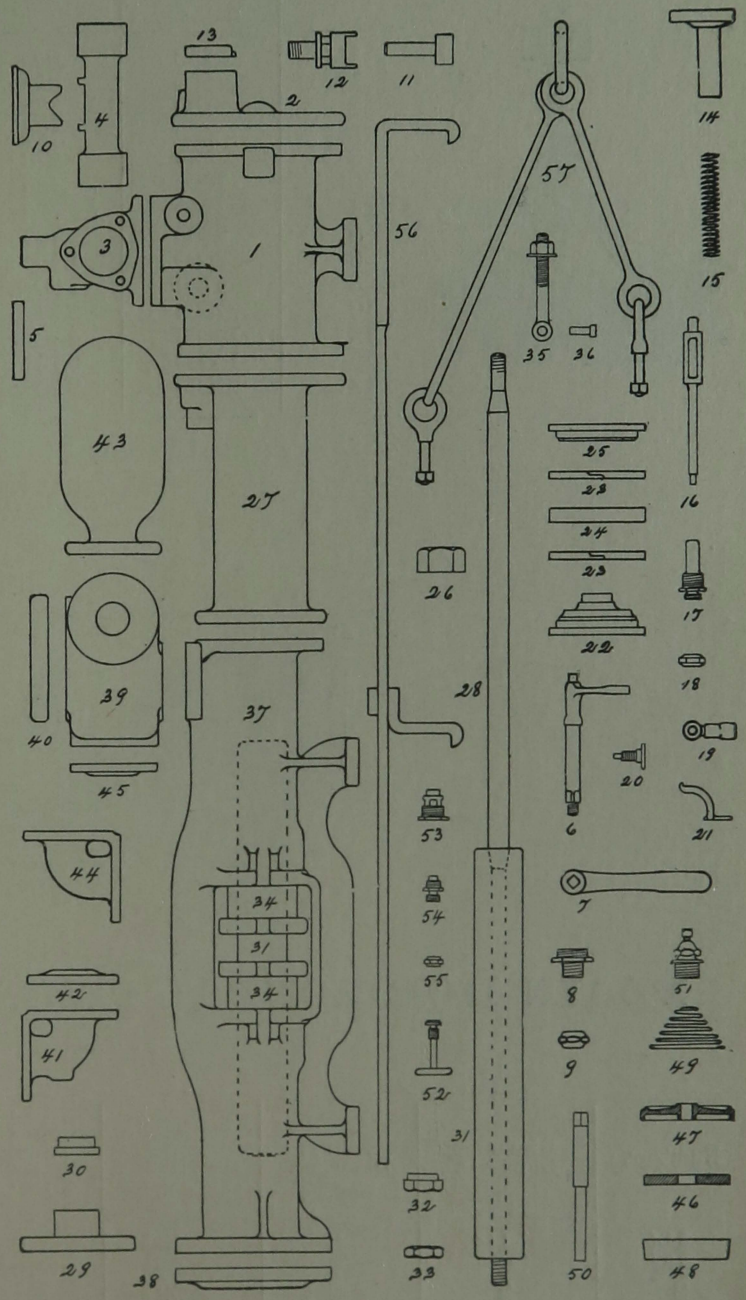
2d. Give shop number, which will be found stamped on valve-chest bonnet, steam cylinder and body piece.

3d. Give name of part from above cut and list.

DETAILS OF CAMERON VERTICAL PLUNGER PUMP.

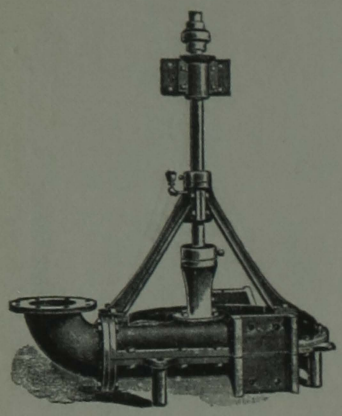
LIST OF PARTS.

1 Steam Cylinder.
2 Steam Cylinder Cover.
3 Steam Chest.
4 Steam Chest Plunger.
5 Steam Chest Cover.
6 Steam Chest Crank.
7 Steam Chest Crank Handle.
8 Steam Chest Stuffing Box.
9 Steam Chest Stuffing Box Cap.
10 Slide Valve.
11 Reversing Valve.
12 Reversing Valve Bushing.
13 Reversing Valve Cap (top).
14 Reversing Valve Cap (bottom).
15 Reversing Valve Cap (bottom) spr'g.
16 Exhaust Cut-off Valve.
17 Exhaust Cut-off Stuffing Box.
18 Exhaust Cut-off Stuffing Box Cap.
19 Exhaust Cut-off Lever.
20 Exhaust Cut-off Handle.
21 Exhaust Cut-off Quadrant.
22 Steam Piston Head.
23 Steam Piston Packing Rings.
24 Steam Piston Bull Ring.
25 Steam Piston Follower.
26 Steam Piston Nut.
27 Body.
28 Piston Rod.
29 Piston Rod Glands.
30 Piston Rod Thimbles.
31 Water Plunger.
32 Water Plunger Packing Nut.
33 Water Plunger Jamb Nut.
34 Water Plunger Glands.
35 Water Plunger Gland Bolt and Nut.
36 Water Plunger Gland Bolt Pin.
37 Water Cylinder Barrel.
38 Water Cylinder Cover.
39 Water Valve Chest.
40 Water Valve Chest Bonnet.
41 Discharge Elbow.
42 Discharge Flange.
43 Air Chamber.
44 Air Chamber Elbow.
45 Suction Flange.
46 Water Valve.



47 Water Valve Guard.
48 Water Valve Seat.
49 Water Valve Spring.
50 Water Valve Stem.
51 Water Valve Stem Plug.
52 Priming Valve.
53 Priming Valve Body.
54 Priming Valve Stuffing Box.
55 Priming Valve Stuffing Box Cap.
56 Hooks.
57 Slings.

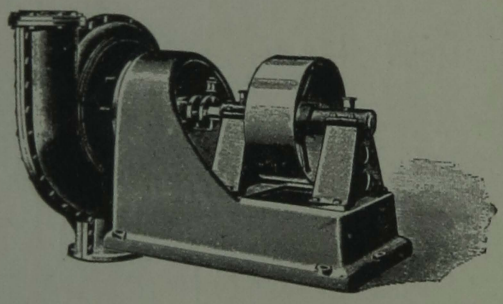
CENTRIFUGAL VERTICAL SUCTION PUMPS.



LIST.

Numbers.	Capacity Per Minute. Gallons.	Horse Power Required Per Foot Lift.	Shipping Weight Pounds.	Iron.	Brass.
1½	150	.063	60	$ 30 00	$ 55 00
1¾	200	.085	100	40 00	90 00
2	300	.126	135	60 00	110 00
2½	450	.190	160	70 00	135 00
3	650	.270	200	75 00	150 00
3½	1000	.425	300	95 00	200 00
4	1250	.504	335	110 00	240 00
5	1850	.765	450	140 00	315 00
6	2600	1.10	650	170 00	360 00
8	4750	1.90	1075	265 00	.....
10	7500	3.14	1300	330 00	.....
12	10000	4.	1450	420 00	.....
15	16000	6.75	2750	600 00	.....
18	22000	9.65	5000	.....	.....

Larger pumps according to specifications.

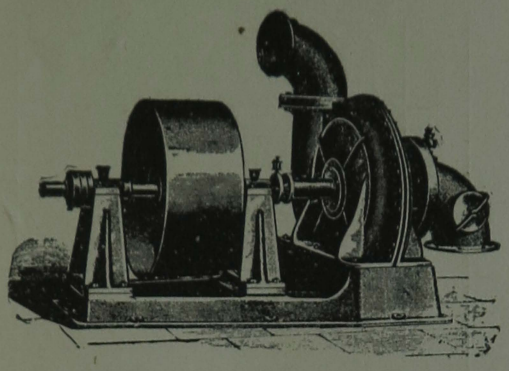


PLAIN HORIZONTAL CENTRIFUGAL PUMPS.

LIST.

Numbers.	Discharge Diameter. Inches.	Suction Diameter. Inches.	Capacity Per Minute. Gallons.	Horse Power Required per Foot Lift.	Shipping Weight Pounds.	Iron.	Brass.
1½	1½	2	150	.063	120	$ 35 00	$ 65 00
1¾	2	2	200	.085	175	50 00	100 00
2	2	2½	300	.126	225	70 00	125 00
2½	2½	3	450	.190	290	80 00	150 00
3	3	4	650	.270	325	95 00	175 00
3½	3½	5	1000	.425	400	110 00	230 00
4	4	5	1250	504	450	130 00	275 00
5	5	6	1850	.765	510	165 00	350 00
6	6	8	2600	1.10	900	200 00	410 00
8	8	10	4750	1.90	1440	310 00	.....
10	10	12	7500	3.14	1680	395 00	.....
12	12	14	10000	4.	1820	500 00	.....
15	15	18	16000	6.75	3800	710 00	.....
18	18	22	22000	9.65	6500	.....	.....

Larger or Special Pumps according to Specifications.

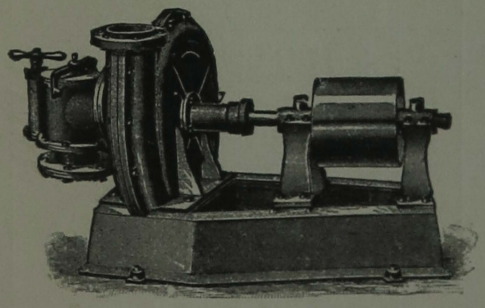


NEW CENTRIFUGAL SAND PUMPS.

LIST.

Numbers.	Diameter of Discharge. Inches.	Diameter of Suction. Inches.	Capacity of Water perMinute. Gallons.	Capacity of Sand, Mud, Silt, etc., per Hour. Cubic Yards.	Horse Power per 15 Foot Lift.	Size of Pulley, Diameter and Face. Inches.	Speed of Pump to Raise Sand etc., 15 Ft.	Floor Space. Inches.	Shipping Weight. Pounds.	Price.
2	2	3	300	10— 20	5	10x10	700	22x35	350	$ 90
3	3	4	650	20— 25	8	10x10	600	24x38	400	120
4	4	5	1250	40— 50	10	12x12	550	28x44	450	150
5	5	6	1850	50— 60	18	12x12	500	30x48	650	175
6	6	8	3000	60— 80	25	12x14	450	42x53	1200	200
8	8	10	5000	100—150	45	20x12	375	48x66	1800	310
10	10	12	8000	225—270	65	30x12	300	50x72	2500	395
12	12	14	12000	300—350	100	40x16	250	52x76	3600	500

Larger pumps according to specifications.



LIST OF IMPROVED HORIZONTAL SUCTION PUMPS, WITH PRIMERS ATTACHED.

Numbers.	Discharge Diameter. Inches.	Suction Diameter. Inches.	Capacity per Minute. Gallons.	Horse Power Required Per Foot Lift.	Shipping Weight. Pounds.	Iron.	Brass.
1½	1½	2	150	.063	150	$ 45	$ 80
1¾	2	2	200	.085	210	60	120
2	2	2½	300	.126	350	85	150
2½	2½	3	450	.190	390	95	175
3	3	4	650	.270	420	110	210
3½	3½	5	1000	.425	480	135	270
4	4	5	1250	.504	540	155	330
5	5	6	1850	.765	590	195	420
6	6	8	2600	1.10	1100	240	495
8	8	10	4750	1.90	1775	375	....
10	10	12	7500	3 14	1800	470	....
12	12	14	10000	4.	2200	600	....
15	15	18	16000	6.75	3800	850	....
18	18	22	22000	9.65	6500	....	....

Larger pumps according to specifications.

CENTRIFUGAL PUMPS.

TABLE OF DIAMETERS OF PULLEYS AND DISCHARGE PIPES.

Also Horse Power per foot lift and number of revolutions per minute necessary to raise water to different heights with the different sizes of Pumps.

Number.	Capacity Per Minute. Gallons.	Horse Power Required Per Foot Lift.	Size of Discharge Pipe. Inches.	Suction Diameter. Inches.	Diameter of Pulleys. Inches.	Face of Pulley. Inches.	REVOLUTIONS PER MINUTE.														
							6 ft.	8 ft.	10 ft.	12 ft.	16 ft.	20 ft.	25 ft.	30 ft.	35 ft.	40 ft.	50 ft.	60 ft.	70 ft.	80 ft.	90 ft.
1¾	200	.085	2	2	6	6	425	590	680	725	825	900	975	1050	1120	1170	1284	1388	1480	1580	1670
2	300	.126	2	2½	7	8	400	450	52,	575	650	720	780	852	908	960	1058	1148	1224	1300	1360
2½	450	.190	2½	3	7	8	375	425	475	525	600	675	720	800	875	940	1010	1100	1160	1250	1300
3	650	.270	3	4	7	8	350	400	425	450	500	550	650	775	850	910	990	1072	1140	1200	1260
3½	1000	.425	3½	5	10	10	325	375	410	425	475	525	625	700	825	900	950	1025	1100	1150	1200
4	1250	.504	4	5	10	10	275	300	350	400	450	500	600	675	800	890	920	994	1020	1100	1150
5	1850	.765	5	6	10	10	260	280	330	380	430	480	560	650	750	860	900	960	1000	1080	1100
6	2600	1.10	6	8	12	12	200	220	240	300	360	420	490	540	580	610	650	700	742	788	832
8	4750	1.90	8	10	15	12	185	200	225	250	310	360	390	425	450	475	500	548	584	628	649
10	7500	3.14	10	12	18	14	166	188	220	245	285	320	360	386	414	436	470	516	548	582	610
12	10000	4.	12	14	20	14	160	180	210	220	246	268	285	300	320	335	365	390	415	436	458
15	16000	6.75	15	18	30	18	100	124	148	172	208	220	236	252	264	277	300	320	340	360	378
18	22000	9.65	18	24	40	24	80	100	110	120	148	155	168	176	204	220	254	274	294	314	334

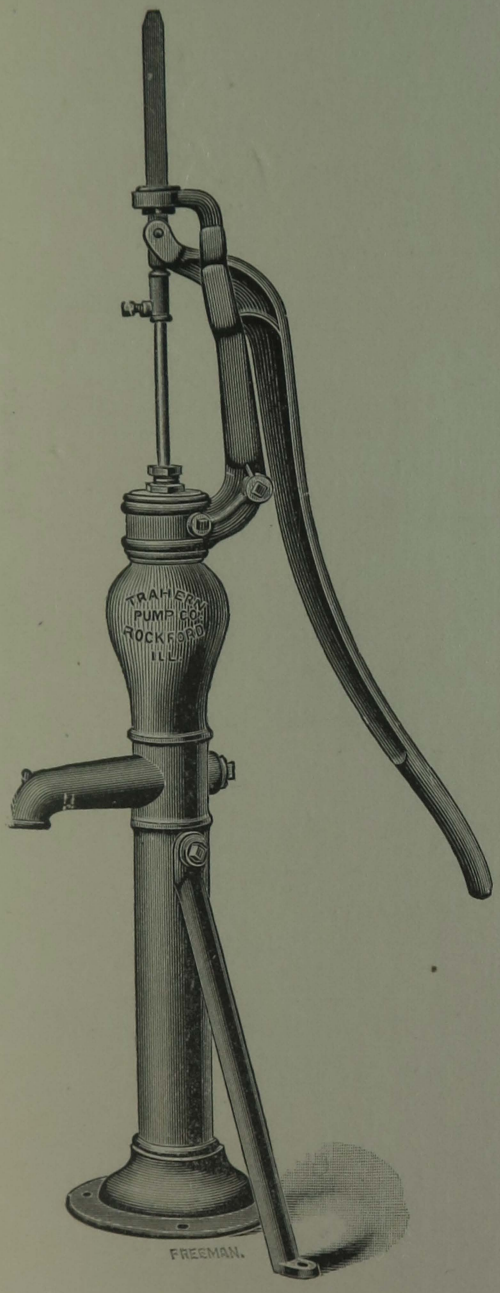
Larger pumps according to specifications.

FOOT VALVE AND STRAINER.

The Foot Valve is placed at the bottom of the suction pipe, and holds the priming. These valves are constructed with heavy flanges. All the larger sizes are hinged in the center, and another special feature is that the opening through the valve is equal to the area of the suction pipe. They are provided with a threaded flange to screw on the end of the suction pipe. I would advise the use of the Foot Valve with all pumps raising water by suction.

NEW HAND AND WINDMILL FORCE PUMPS.

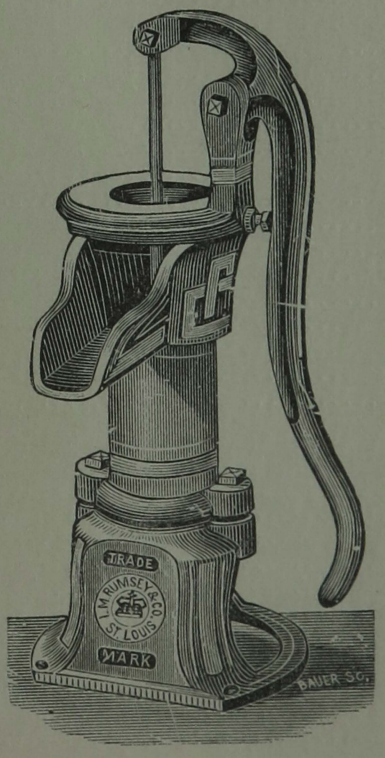
THREE SET-SCREW CAP.



LIST.

Fig. 172 { 6-Inch Stroke $8 00
10-Inch Stroke..... 9 50

PITCHER SPOUT CISTERN PUMPS.



LIST.

No. 1. 2¼-Inch Bore, suitable for 1-Inch Pipe, each..... $4 25
No. 2. 2½-Inch Bore, suitable for 1¼-Inch Pipe, each..... 4 75
No. 3. 2¾-Inch Bore, suitable for 1¼-Inch Pipe, each..... 5 25
No. 4. 3 -Inch Bore, suitable for 1¼-Inch Pipe, each..... 5 75

We carry a variety of styles of Windmill, Hand and Force Pumps, although we show only one style here. Will furnish Catalogue and prices on application.

PUMP CYLINDERS.

LIST.

Iron Cylinders.

2¼ x 10	$ 4 00
2½ x 10	4 35
2¾ x 10	4 70
3 x 10	5 00
3¼ x 10	5 30
3½ x 10	5 60
4 x 10	6 50
4½ x 10	7 50
2 x 12	5 50
2¼ x 12	5 75
2½ x 12	6 00
2¾ x 12	6 50
3 x 12	7 00
3¼ x 12	7 50
3½ x 12	8 00
4 x 12	9 25
4½ x 12	10 75
5½ x 12	15 00
2¼ x 14	6 25
2½ x 14	6 50
2¾ x 14	7 00
3 x 14	7 50
3¼ x 14	8 00
3½ x 14	8 50
4 x 14	10 00
2 x 16	6 25
2¼ x 16	6 50
2½ x 16	7 00
2¾ x 16	7 50
3 x 16	8 00
3¼ x 16	8 50
3½ x 16	9 00
4 x 16	10 50
4½ x 16	12 50
6 x 16	22 00
2¼ x 18	7 00
2½ x 18	7 50
2¾ x 18	8 00
3 x 18	8 50
3¼ x 18	$ 9 00
3½ x 18	9 50
4 x 18	11 00
4½ x 18	14 00
5½ x 18	20 00
2 x 20	7 00
2¼ x 20	7 50
2½ x 20	8 00
2¾ x 20	8 50
3 x 20	9 00

Brass-Lined Cylinders.

2¼ x 10	$ 7 25
2½ x 10	7 75
2¾ x 10	8 25
3 x 10	8 75
3¼ x 10	9 25
3½ x 10	10 00
2¼ x 12	8 00
2½ x 12	8 50
2¾ x 12	9 00
3 x 12	9 50
3¼ x 12	10 25
3½ x 12	11 00
2 x 14	8 25
2¼ x 14	8 75
2½ x 14	9 25
2¾ x 14	9 75
3 x 14	10 25
3¼ x 14	11 00
3½ x 14	11 75
2 x 16	9 00
2¼ x 16	9 50
2½ x 16	10 00
2¾ x 16	10 50
3 x 16	11 00
3¼ x 16	11 75
3½ x 16	12 50

Brass Body Cylinders with Brass Yokes and Brass Plungers.

2 x 10	$ 6 75
2¼ x 10	7 25
2½ x 10	7 75
2¾ x 10	8 25
3 x 10	8 75
3¼ x 10	9 25
3½ x 10	10 00
4 x 10	12 00
4½ x 10	14 00
2 x 12	7 50
2¼ x 12	8 00
2½ x 12	8 50
2¾ x 12	9 00
3 x 12	9 50
3¼ x 12	10 25
3½ x 12	11 00
4 x 12	13 00
4½ x 12	15 00
2 x 14	8 25
2¼ x 14	8 75
2½ x 14	9 25
2¾ x 14	9 75
3 x 14	10 25
3¼ x 14	11 00
3½ x 14	11 75
4 x 14	14 00
4½ x 14	$16 00
2 x 16	9 00
2¼ x 16	9 50
2½ x 16	10 00
2¾ x 16	10 50
3 x 16	11 00
3¼ x 16	11 75
3½ x 16	12 50
4 x 16	15 00
4½ x 16	18 00
5 x 16	24 00
5½ x 16	30 00
6 x 16	36 00
2 x 18	9 75
2¼ x 18	10 25
2½ x 18	10 75
2¾ x 18	11 25
3 x 18	11 75
3¼ x 18	12 50
3½ x 18	13 25
4 x 18	16 50
4½ x 18	20 00
5 x 18	26 00
5½ x 18	34 00
6 x 18	42 00

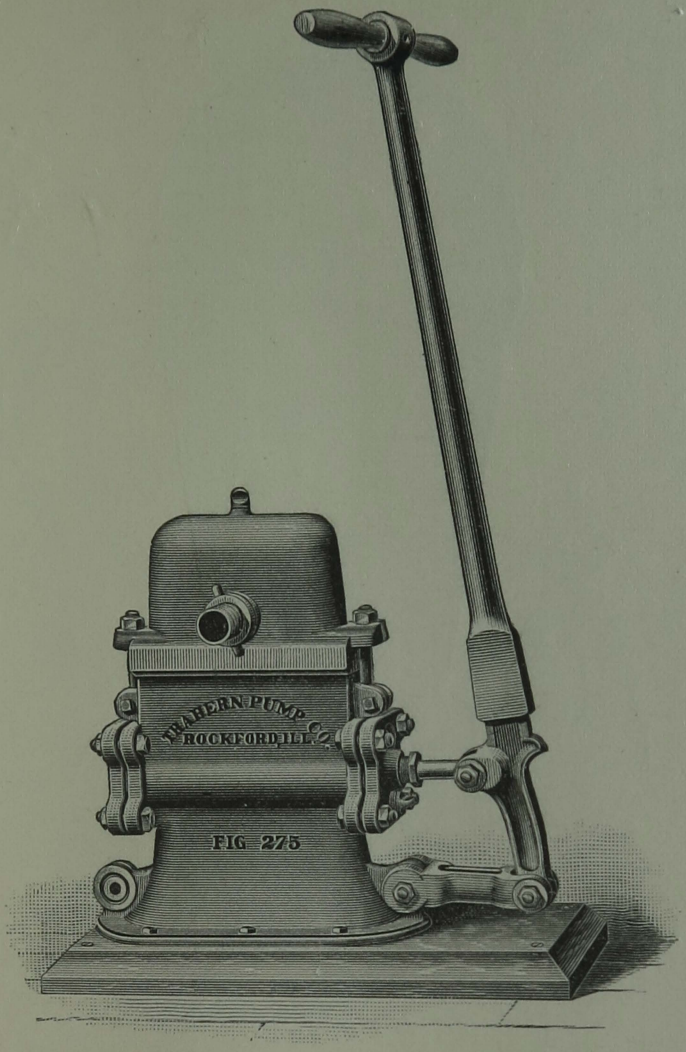


FIG 275

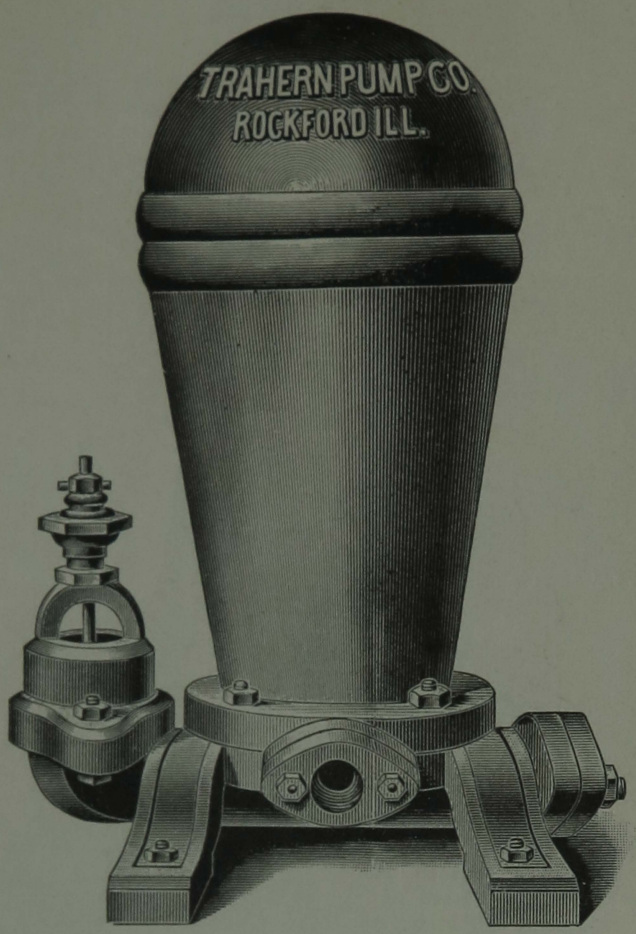
HORIZONTAL DOUBLE-ACTING SUCTION AND FORCE PUMPS.

FIG. 275. The valves are grouped together under the air chamber and are of easy access, without disturbing either the suction or discharge pipes, by unscrewing the heavy brass nut on top of the air chamber, when the whole pump can be taken apart. The suction and discharge openings screwed for iron pipe are on both sides of the cylinder. We plug one set, so that suction or discharge can be used on either or both sides if necessary.

LIST.

Number.	Size Cylinder.	Suction Fitted For	Discharge Fitted For	Stroke.	Price, Iron.
275	3 Inches.	1½ Inch Pipe	1¼ Inch Pipe.	5¼ Inches.	$27 00

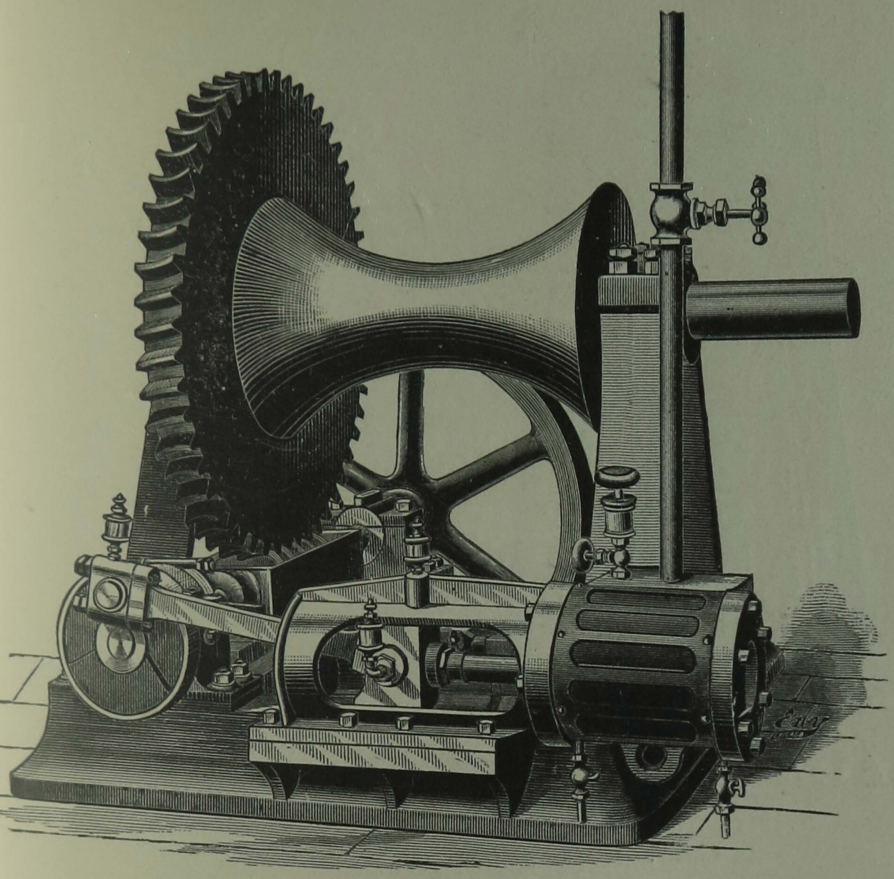
Number.	Diameter Cylinder.	Double Suction.	Double Discharge.	Stroke.	Capacity Per Stroke.	Price, Iron.
280	2½ Inches.	1¼ Inches.	1 Inch.	5 Inch.	⅓ Gallon.	$16 00



HYDRAULIC RAMS.

Numbers.	Quantity of Water Furnished per Minute by Spring or Brook to which the Ram is adapted.	Length of Pipes.		Size of Pipes.		Price.
		Drive.	Discharge.	Drive.	Discharge.	
2	3 quarts to 2 gallons per minute	25 to 50 feet.	Any length desired.	¾ in.	⅜ in.	$ 9 00
3	1½ gallons to 4 gallons per minute			1 in.	½ in.	11 00
4	3 gallons to 7 gallons per minute			1¼ in.	½ in.	14 00
5	6 gallons to 14 gallons per minute			2 in.	¾ in.	22 00
6	12 gallons to 25 gallons per minute			2½ in.	1 in.	40 00
7	20 gallons to 40 gallons per minute			2½ and 2¾ in.	1¼ in.	60 00
10	25 gallons to 75 gallons per minute			4 in.	2 in.	150 00

With 10 feet fall these rams are successfully used to drive water 100 or 200 rods to a position 100 or 200 feet above a level with the ram.



STEAM WINCH.

This Steam Winch has been specially designed for handling heavy loads. As shown in the cut, it is provided with a curved winch head for manilla rope. We also build them with a straight drum for wire rope. In this case the drum is loose on the shaft, and is driven by a clutch. It is also provided with a very powerful strap brake for lowering.

For strength, lightness and simplicity, this hoist is not equalled by any other machine made.

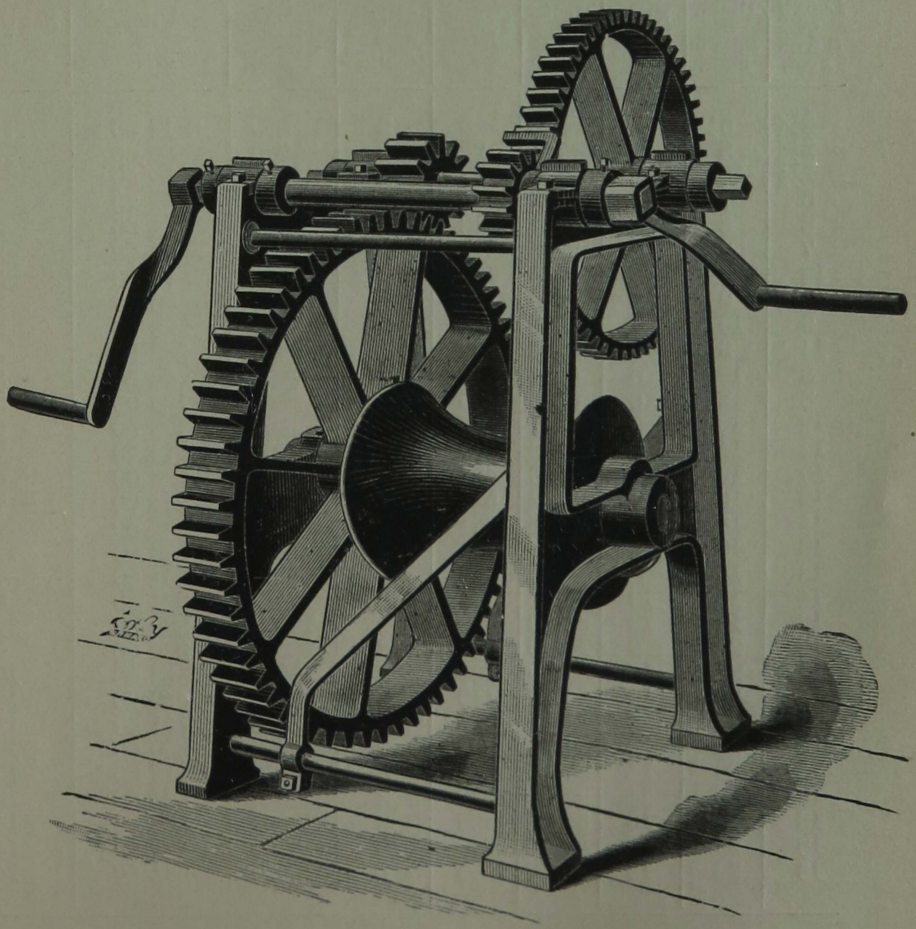
Capacity, straight lift, no blocks, 10,000 pounds.
Cylinder, 5 in. diameter, 6 in. stroke.
Drum, 12 in. diameter, 20 in. long.
Speed of hoisting, 30 ft. per minute.
Total weight, 2,100 pounds.
Price, complete, $350.00.

HAND WINCH.

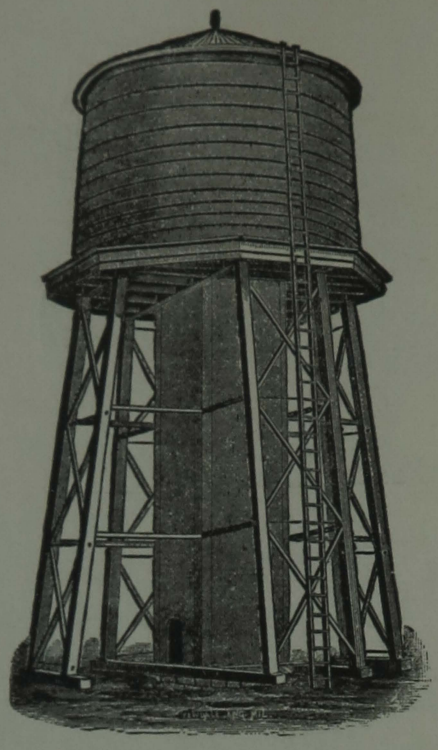
Our Hand Winch is very powerfully geared.

It is entirely self-contained, and can be moved with ease.

We build the Hand Winch with both curved winch head and straight drum for wire rope.



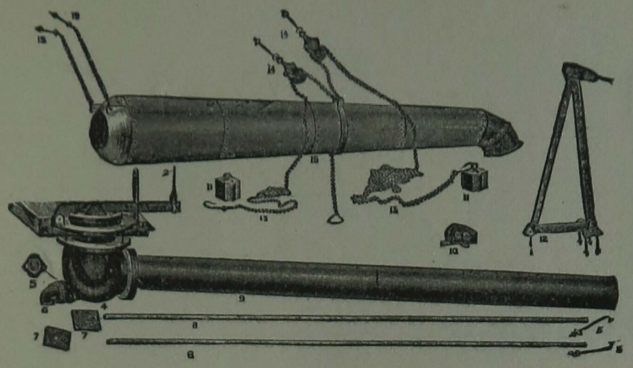
Ratio of Gearing .....30 to 1.
Diameter of Drum ..12 inches.
Length of Handles..16 inches.
Weight.....1,000 pounds.
Price $100.00



RAILROAD TANKS.

LIST.

Length of Stave. Feet.	Diam. of Bott'm Feet.	Number of Hoops.	Capacity. Galls.	Capacity. Barrels.	Thickness of Lumber.	Estimated Weight Riveted Hoops.	Price, f. o. b. Denver.	Net One Pair of Lugs to Each Hoop.	Two Pairs of Lugs to Each Hoop.	Three Pairs of Lugs to Each Hoop.
2½	5½	2	258	8	3	500	$ 18 00	.....	.....	.....
2½	8	2	720	22½	3	900	29 00	.....	.....	.....
2½	10	2	1185	37	3	1300	39 50	.....	.....	.....
5	7	4	1292	40	2	700	32 70	$ 3 25	.....	.....
8	6	6	1541	48	2	1000	42 00	3 25	.....	.....
7	8	6	2395	74	2	1200	51 00	3 25	.....	.....
12	8	8	4234	132	2	1900	76 60	3 25	.....	.....
10	9	7	4356	136	2	1900	80 00	3 25	$ 6 50	.....
9	10	7	4949	158	2	2600	98 60	3 25	6 50	.....
14	9	9	6190	193	2	2500	102 50	4 25	8 50	.....
8	10	6	4161	130	2	1800	82 30	3 25	6 50	.....
8	12	6	6800	215	2	2800	120 00	3 25	6 50	.....
12	12	8	9463	295	3	4600	183 50	6 25	12 50	.....
12	14	8	12896	403	3	5700	212 70	7 00	14 00	.....
10	16	7	13990	437	3	6000	228 00	6 25	12 50	.....
12	16	7	16939	529	3	7000	254 00	7 00	14 00	.....
14	16	10	19886	621	3	7500	286 50	10 00	20 00	.....
16	16	12	22835	713	3	8600	328 60	12 00	24 00	.....
12	18	9	21090	659	3	8500	301 00	7 50	15 00	.....
14	18	10	24762	774	3	8500	334 40	9 50	19 00	.....
16	18	12	28430	888	3	10000	398 00	12 00	24 00	.....
12	20	9	26140	816	3	10000	339 00	9 00	18 00	$27 00
14	20	10	32000	1000	3	11000	383 60	10 00	20 00	30 00
16	20	12	36780	1149	3	12000	440 20	12 00	24 00	36 00
16	22	12	42837	1340	3	13500	491 50	12 00	24 00	36 00
16	24	12	51000	1600	3	15000	550 00	12 00	24 00	36 00
16	30	14	80000	2500	3	20000	779 00	15 00	30 00	45 00
18	30	14	90500	2830	3	21000	861 00	15 00	30 00	45 00
18	24	13	57600	1800	3	17000	608 00	14 00	28 00	42 00
18	20	13	39976	1250	3	13500	491 50	14 00	28 00	42 00
18	22	13	57600	1508	3	15000	544 00	14 00	28 00	42 00



RAILROAD TANK FIXTURES.

THE IMPROVED ECLIPSE NO. 2.

MADE IN 7 IN. AND 8 IN. SIZES.

ADVANTAGES OF THIS CONSTRUCTION.

1st. The long, cast outlet pipe No. 9, carries the valve No. 1 back near the center of tank, thereby placing it out of the reach of frost.

2nd. The pitch of drop or cast outlet pipe No. 9, being considerable, causes the water to follow out so as to clear the pipe quickly after the valve No. 1, is closed, in this way preventing the gush of a quantity of water from the cast outlet pipe No. 9, upon the track after the galvanized sway pipe No. 16, is drawn up.

3rd. The elbow No. 4, at back end of cast outlet pipe No. 9, is enlarged and drops below the level of the lower side of cast outlet pipe No. 9, so that in case the rubber valve face becomes worn from long usage and leaks, the water would accumulate in this depression and pass out of the small valve No. 5, in the rear of elbow No 4, instead of dripping from the end next the track and forming ice over the rails.

4th. The small valve No. 5 in the elbow No. 4, admits air readily and in this way entirely prevents re-bounding of the valve, which is a great annoyance in some makes of fixtures.

5th. The small valve No. 5, acting automatically, closes with the pressure when an engine is taking water and opens instantly when relieved of the pressure, allowing air to pass in and any drip or drainage to pass out.

6th. The quadrant lever No. 12, at top of tank for raising the valve No. 1, operates better and is a much more sightly arrangement than the old style of overhead lever extending out over the track.

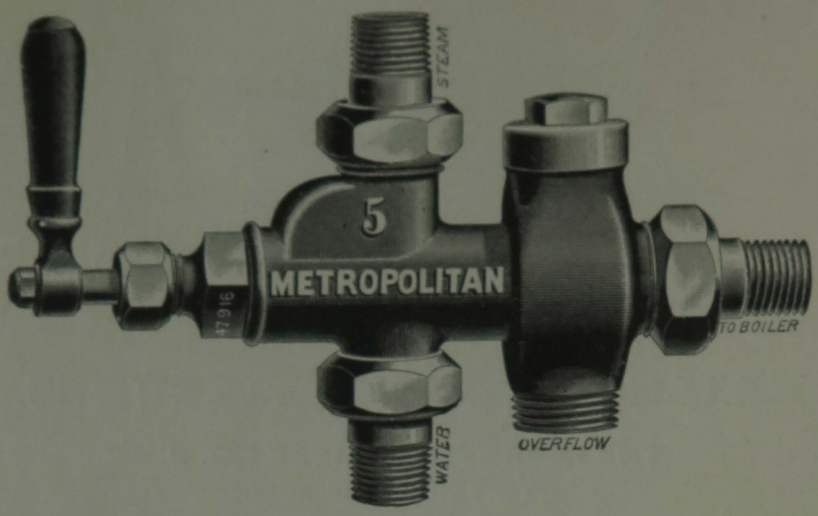
7th. The weights Nos. 11, 11, which raise the galvanized sway pipe No. 16, run on gas pipe guides Nos. 8, 8, which prevent then from bounding off or getting out of place.

LIST.

Size.	Pattern.	Shipping Weight, Full Set.	Fixtures Complete.	Tank Valve alone.
*7 inch	No. 2	1,000 lbs.	$150 00	$32 00
*8 "	" 2	1,150 "	185 00	40 00

*Special lengths for 30 feet diameter tanks $20.00 extra.

Prices embrace with No. 1 pattern, 24 feet $\frac{3}{4}$-inch manilla rope, two gaskets for valve and flange of elbow, one valve rod, and for No. 2 pattern the same appurtenances with 15 feet of $\frac{3}{8}$-inch wire rope additional.



THE METROPOLITAN AUTOMATIC INJECTORS.

1. *It is absolutely reliable.* It will start readily when the Injector and suction are hot.

2. *It has a great range.* This Injector will start with a low and work with a high steam pressure.

3. *The feed can be regulated.* On a short lift with steam pressures of from 80 to 100 pounds, the capacity can be reduced about one-half. This enables the Injector to be regulated to keep a steady feed.

4. *It is operated entirely by one handle.*

5. *Its construction is simple.* By removing the coupling nut on the delivery end of the Injector the combining and delivery tube *C D R* can be unscrewed. This does not require any special tools—only a common monkey wrench. The overflow valve can be re-ground by removing the valve cap. *It can be used as lifter or non-lifter.*

LIST.

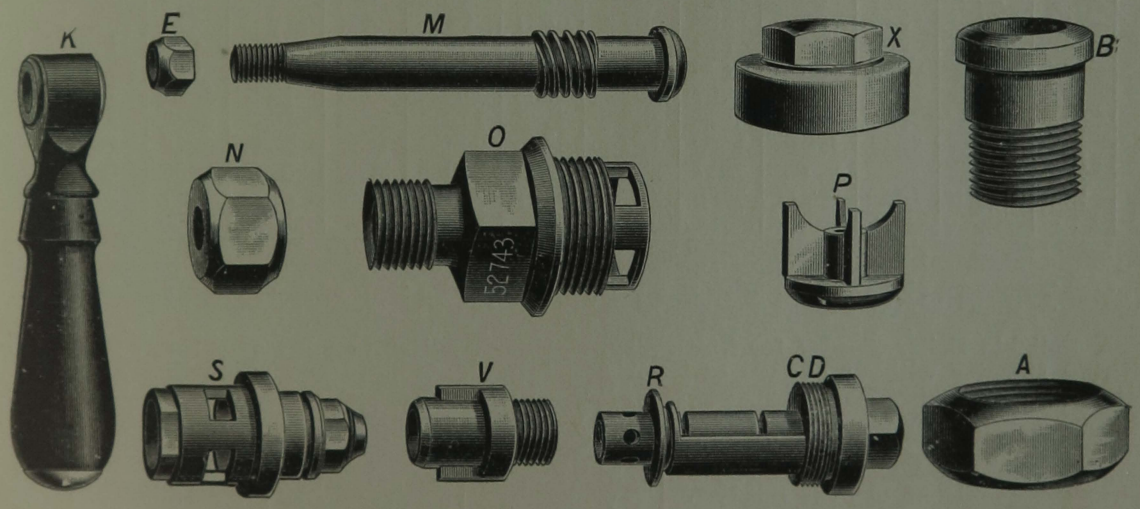
Numbers.	Size of Pipe Connections.			Capacity with Steam Pressure 80 Lbs. 2-Foot Lift. Gallons.	Horse Power of Boiler.	Prices.
	Steam. Inches.	Suction. Inches.	Delivery. Inches.			
2	⅜	⅜	⅜	60	4 to 6	$ 15 00
3	⅜	⅜	⅜	80	6 to 8	16 00
3½	½	½	½	120	8 to 15	18 00
4	½	½	½	165	15 to 20	20 00
5	¾	¾	¾	250	20 to 30	25 00
6	¾	¾	¾	350	30 to 45	30 00
7	1	1	1	500	45 to 65	40 00
8	1	1	1	600	65 to 80	45 00
9	1¼	1¼	1¼	800	80 to 100	55 00
10	1¼	1¼	1¼	1000	100 to 130	60 00
11	1½	1½	1½	1300	130 to 170	75 00
12	1½	1½	1½	1750	170 to 230	90 00
13	2	2	2	2300	230 to 300	110 00
14	2	2	2	2850	300 to 375	125 00

REPAIRS.

In ordering parts for repairs refer to the cuts. Specify the number of each part required, calling same by the name and letter given below. Always state the size number of the Injector, and the serial or factory number.

LIST.

SIZE OF INJECTOR—NUMBERS.	2–3	3½–4	5–6	7–8	9–10	11–12	13–14
S—Steam Jet	$ 75	$1 00	$1 25	$1 50	$1 75	$2 00	$2 50
V—Suction Jet	50	60	70	90	1 20	1 40	1 60
C-D-R—Combining and Delivery Tube and Auxiliary Check	2 00	2 50	3 00	3 50	4 00	5 00	7 00
P—Overflow Valve	50	60	70	80	1 00	1 20	1 40
O—Steam Plug	80	90	1 00	1 20	1 40	1 60	1 80
M—Steam Valve and Stem	90	1 00	1 00	1 30	1 50	1 70	1 90
N—Packing Nut	30	40	50	70	1 00	1 20	1 40
K—Steam Valve Handle	60	70	80	1 00	1 20	1 40	1 60
A-B—Coupling Nut and Tail Pipe	1 00	1 50	2 00	3 00	4 00	5 00	6 00
X—Overflow Cap	50	60	70	80	1 00	1 20	1 40

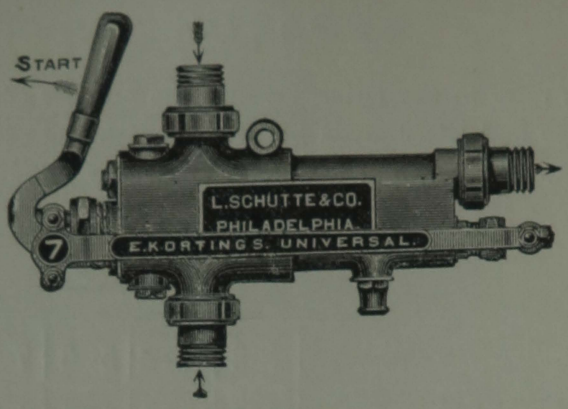


PARTS OF THE METROPOLITAN AUTOMATIC INJECTOR.

By unscrewing the steam plug *O*, the steam jet *S* is removed. The suction jet *V* is screwed into the Injector. It will not wear out in years, and when it is necessary to renew it the Injector should be returned for a general overhauling.

The combining tube *CD* is made square on the end so that it can be removed by an ordinary monkey wrench. Be careful that the ring *R* is not lost, also that it is on the tube in the position as shown in the cuts. Be sure that this tube is not stopped up and that the small slots and drill holes are clean.

If the water used is limy the tubes should be cleaned frequently by placing them in a solution of ten parts of water to one part of muriatic acid, until the deposit is removed.



KORTING'S UNIVERSAL INJECTORS.

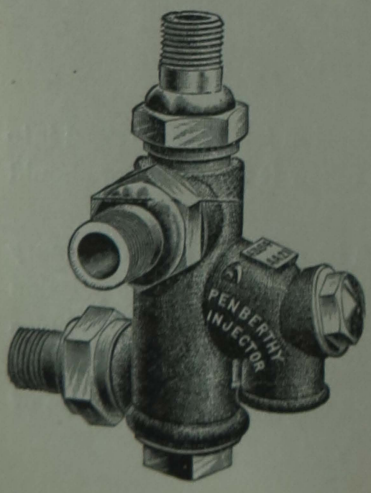
LIST.

Numbers.	Size of Iron Pipe Connections. Inches.	PRESSURE OF STEAM IN POUNDS. 30 H. P. or Cubic Feet Per Hour.	30 Gallons Per Hour.	45 H. P. or Cubic Feet Per Hour.	45 Gallons Per Hour.	60 H. P. or Cubic Feet Per Hour.	60 Gallons Per Hour.	90 H. P. or Cubic Feet Per Hour.	90 Gallons Per Hour.	120 H. P. or Cubic Feet Per Hour.	120 Gallons Per Hour.	Size of Copper Pipe. Outside Diameter. Inches.	Price of Injector. All Brass.
00	1/8	3.5	26	4	30	5	37	6	45	7	52	1/4	$ 20 00
0	1/4	9	67	10.5	79	12	90	13	97	14	105	3/8	21 00
1	3/8	13	97	14.5	109	16.5	124	18.5	139	21	157	1/2	23 00
2	1/2	20	150	22	165	25	187	27	202	29	217	5/8	28 00
3	3/4	33	247	36	270	39	292	43	322	48	360	7/8	38 00
3 1/2	3/4	46	345	51	382	57	427	61	457	66	495	7/8	46 00
4	1	60	450	68	510	76	570	81	607	86	645	1 1/8	55 00
5	1 1/4	75	562	86	645	98	735	104	780	111	832	1 1/2	60 00
6	1 1/4	90	675	105	787	120	900	128	960	136	1020	1 1/2	65 00
7	1 1/2	128	960	139	1042	150	1125	172	1290	195	1462	1 3/4	85 00
8	1 1/2	165	1237	180	1350	195	1462	225	1687	255	1912	1 3/4	100 00
9	2	195	1462	217	1627	240	1800	270	2025	300	2250	2 1/4	120 00
10	2	240	1800	262	1965	285	2137	315	2362	345	2587	2 1/4	135 00

PENBERTHY AUTOMATIC INJECTORS.

A Reliable Boiler Feeder for Stationary, Marine, Traction and Portable Boilers. A lifting or non-lifting Injector without change of jets. Absolutely automatic and re-starting. One valve to operate.

LIST.



Numbers.	Gallons per hour, 65 lbs. pressure.	Size of Pipe Connection.—Inches.	Horse Power of Boiler.	Price.
OO	60	3/8	4 to 8	$ 16 00
A	110	1/2	8 to 12	18 00
AA	150	1/2	12 to 16	20 00
B	220	3/4	16 to 28	25 00
BB	300	3/4	28 to 40	30 00
C	450	1	40 to 57	40 00
CC	540	1	57 to 72	45 00
D	700	1 1/4	72 to 93	55 00
DD	900	1 1/4	93 to 120	60 00
E	1290	1 1/2	120 to 160	75 00
EE	1740	1 1/2	160 to 220	90 00
F	2270	2	220 to 290	110 00
FF	2800	2	290 to 308	125 00

Capacity based on 65 lbs. steam, 4 feet lift. A long lift decreases capacity in all injectors.

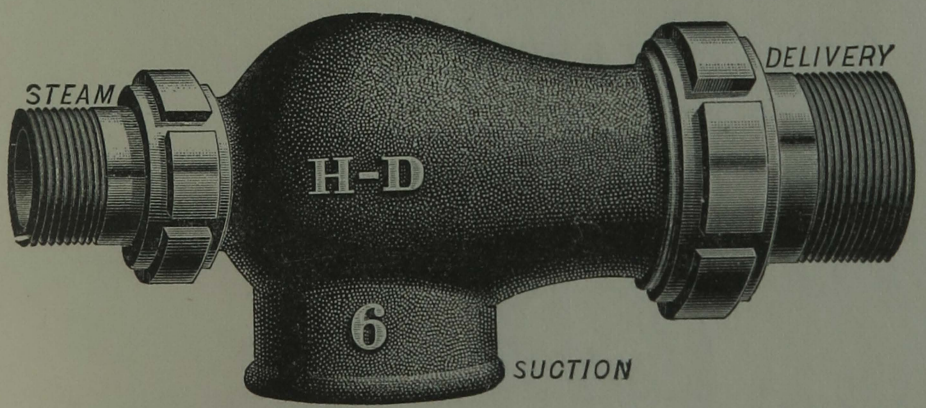
BLAKESLEE JET PUMPS.

DIRECTIONS.—Turn on the steam slowly until the suction is formed, which will be indicated by a peculiar singing noise in the pump; then turn on steam enough to drive the water to point of discharge. If the pump fails to start, and the suction pipe gets hot, it is caused by leaks or obstructions in the suction pipe, or pump, or by too high suction. Twenty-five pounds of steam ought always to form the suction, and higher steam must be carried according to the heighth of discharge, at about the rate of one pound to each foot. The brass set-screw is to draw off the condensed steam in cold weather.

LIST.

Size of Pump. Inches.	Suction Pipe. Inches.	Discharge Pipe. Inches.	Steam Pipe. Inches.	Steam Opening. Inches.	Capacity Per Minute. Gallons.	Price.
¾	¾	½	⅜	3/16	8	$ 8 00
1	1	¾	½	4/16	15	10 00
1¼	1¼	1	½	5/16	20	12 00
1½	1½	1¼	¾	6/16	30	14 00
2	2	1½	¾	7/16	40	16 00
2½	2½	2	1	8/16	50	20 00
3	3	2½	1	9/16	60	24 00

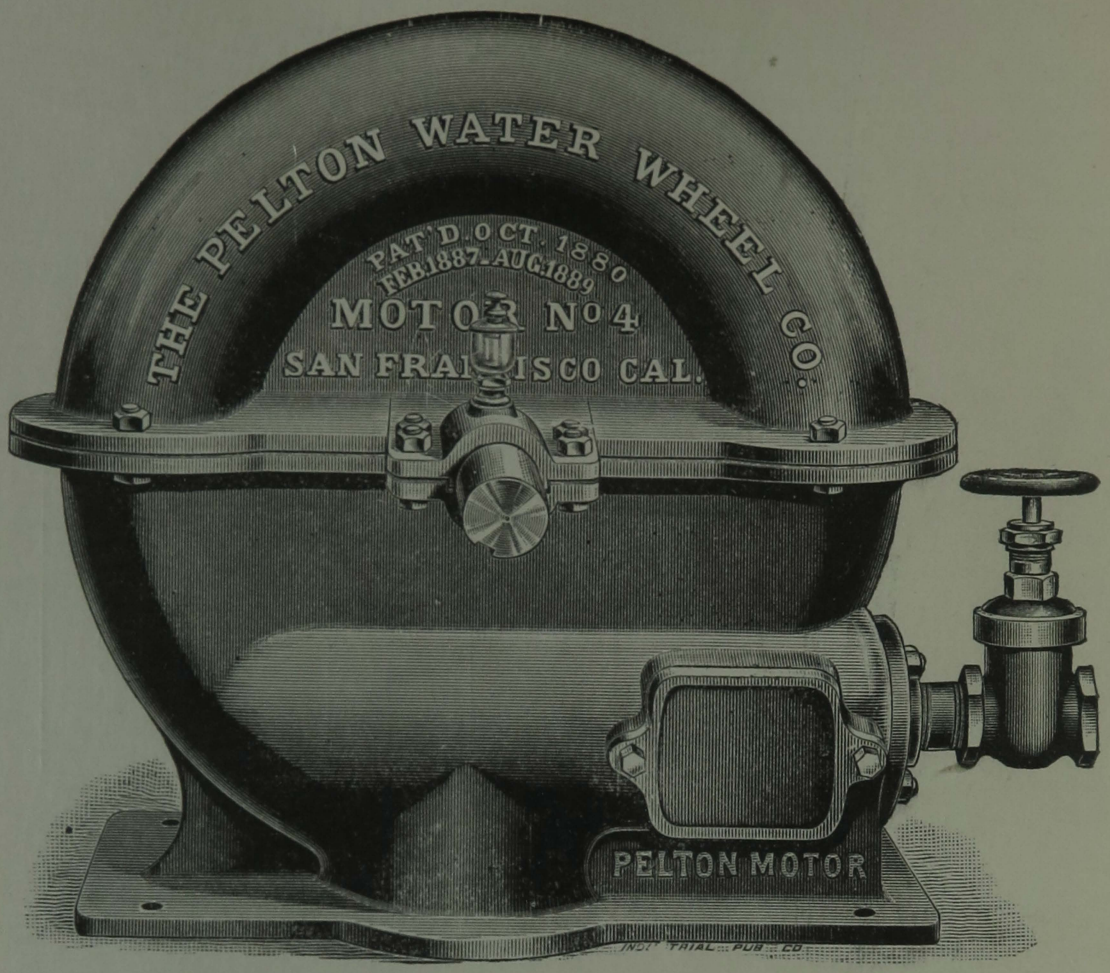
STEAM JET PUMPS.



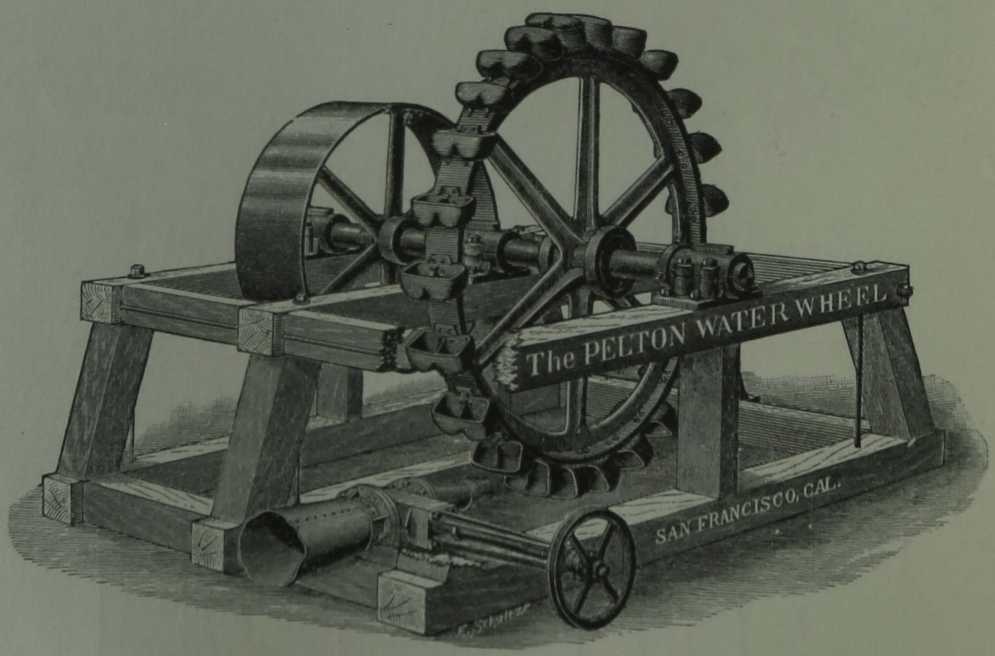
LIST.

Numbers.	Steam Connection. Inches.	Suction and Delivery. Inches.	Capacity per Hour 65 Pounds Steam. Gallons.	Price.	Strainers. Price.
1. Brass.	⅜	½	250	$ 8 00	$ 50
2. Brass.	½	¾	500	10 00	75
3. Brass.	¾	1	960	15 00	1 00
4. Brass.	1	1¼	1300	20 00	1 25
5. Brass.	1	1½	2000	25 00	1 50
6. Brass.	1¼	2	3500	35 00	1 75
7. Iron.	1¼	2½	5000	40 00	.....
8. Iron.	2	3	8000	50 00	.....

Capacity based on 4-feet lift.



WATER MOTERS.



PELTON WATER WHEELS.

A Marvel of Energy and Power.

PELTON WATER WHEELS.

LIST—STANDARD SIZES.

Head. Feet.	3-FOOT WHEEL.		4-FOOT WHEEL.		5-FOOT WHEEL.		6-FOOT WHEEL.	
	Horse Power.	Price.	Horse Power.	Price.	Horse Power.	Price.	Horse Power.	Price.
20	1 50	$220 00	2.64	$285 00	4 18	$350 00	6 00	$400 00
50	5.98	220 00	10.60	285 00	16.63	350 00	23 93	400 00
80	12.04	230 00	21.44	295 00	33 54	370 00	48.16	425 00
100	16.84	240 00	29.93	300 00	46.85	380 00	67.36	450 00
150	31.01	250 00	55 08	320 00	86 22	400 00	124.04	475 00
200	47.75	265 00	84 81	350 00	132.70	425 00	191.00	500 00
250	66.74	280 00	118.54	375 00	185.47	450 00	266 96	550 00
300	87.73	300 00	155.83	400 00	243.82	485 00	350.94	625 00
350	110 56	320 00	196 38	425 00	307.25	550 00	342.27	700 00
400	135 08	340 00	239.94	460 00	375.40	625 00	540.35	800 00
450	161.19	360 00	286.31	500 00	447.95	700 00	644.78	900 00
500	188.80	390 00	335.34	540 00	524.66	775 00	755.20	1000 00
550	223 76	425 00	397.43	600 00	621.82	.....	895 04	.....
600	248.16	450 00	440.77	675 00	689.63	.....	992 65	.....
700	312.73	500 00	555.46	750 00	869.06	.....	1250 92	.....
800	382.09	.....	678 66	.....	1061.81	.....	1528.36	.....
900	455.94	.....	809 82	.....	1267 02	.....	1823.76	.....
1000	534.01	.....	948.48	.....	1483 97	.....	2136.04	.....
	Weight, 700 to 1000 pounds.		Weight, 1000 to 1700 pounds.		Weight, 1400 to 2100 pounds.		Weight, 2100 to 3000 pounds.	

LIST—TWO-NOZZLE WHEELS.

Head. Feet.	3-FT. WHEEL.		4-FT. WHEEL.		6-FT. WHEEL.	
	Horse Power.	Price	Horse Power.	Price	Horse Power.	Price
20	3.00	$300	5.28	$375	12.00	$500
30	5.52	300	9.76	375	22 08	500
40	8.48	310	15.16	380	33.92	510
50	11.96	325	21 28	385	47.86	520
60	15.68	340	27.88	390	62.72	530
70	19.76	360	35 16	400	79.04	550
80	24.08	380	42 88	420	96.32	575
100	33 68	400	59 86	450	134.72	600
150	62.02	440	110.16	500	248 08	700
200	95.50	480	169 62	575	382 00	800
250	133 48	525	237.08	650	533.92	900
	Weight, 950 to 1250 lbs.		Weight, 1250 to 2000 lbs.		Weight, 2400 to 4000 lbs.	

LIST—SPECIAL WHEELS.

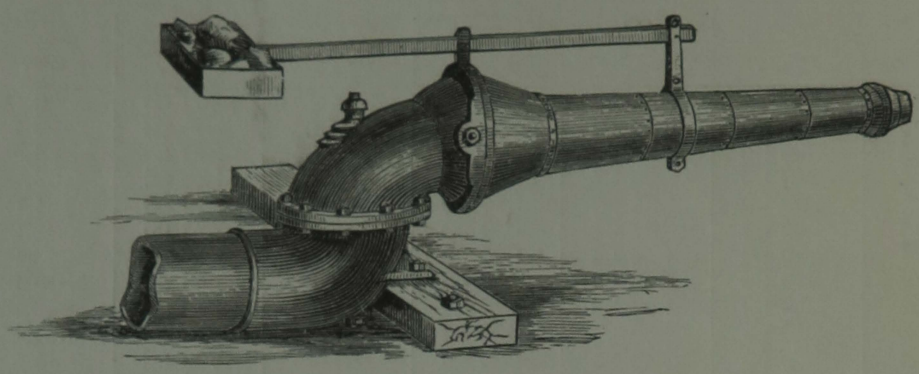
Head. Feet.	2 Nozzle 67-In. Wheel.		3 Nozzle 67-In. Wheel.		4 Nozzle 8-Ft. Wheel		5 Nozzle 10-Ft. Wheel.	
	Horse Power	Price	Horse Power	Price	Horse Power.	Price	Horse Power.	Price
20	20.80	....	30.12	....	40.16	....	52.00	....
30	38.20	....	57.30	....	76.40	....	95.50	....
40	59.00	....	88.50	....	118.00	....	147.50	....
50	82.40	....	123.60	....	164 80	....	206.00	....
60	107.60	....	161.40	....	215.20	....	269.00	....
70	135.62	....	203.43	....	271.25	....	339.05	....
80	165.00	....	247.50	....	330.00	....	412.50	....
100	232.50	....	348.75	....	465.00	....	581 25	....
120	302.90	....	454.35	....	605.80	....	757.25	....
150	425.10	....	637.65	....	850.20	....	1062.75	....
200	655.00	....	982.50	....	1310.00	....	1637.50	....
	Weight, ...		Weight, ...		Weight, ...		Weight, ...	

NOTE —Prices on all Special Wheels quoted on application, also on wheels of larger diameter or capacity than above given.

PELTON MOTORS.

LIST.

Head. Feet.	No. 1. 6-INCH WHEEL.		No. 2. 12-INCH WHEEL.		No. 3. 18-INCH WHEEL.		No. 4. 18-INCH WHEEL.		No. 5. 24-INCH WHEEL.	
	Horse Power.	Price.	Horse Power.	Price.	Horse Power.	Price.	Horse Power.	Price.	Horse Power.	Price.
20	.05	$30	.12	$60	.20	$125	.37	$175	.66	$275
50	.21	30	.49	60	.84	125	1.49	175	2.65	275
80	.43	30	1.00	60	1.70	125	3 10	175	5.36	275
100	.60	30	1.40	60	2.32	125	4 21	175	7.49	275
150	1.10	30	2 58	60	4.37	125	7.75	175	13.77	275
200	1 70	30	3.97	60	6.74	125	11 93	175	21.20	275
250	2.38	30	5.56	60	9.42	125	16.68	175	29 63	275
300	3.13	35	7.31	70	12 38	140	21.93	200	38 95	300
350	3.94	35	9 21	70	15.61	140	27.64	200	49 09	300
400	4.82	40	11.25	80	19 07	150	33.77	220	59.98	320
450	5.75	40	13.43	80	22 76	150	40.29	220	71.57	320
500	6.74	50	15 73	90	26 66	160	47.20	230	83.83	330



Patented November 27, 1888.

HYDRAULIC GIANTS.

("Fisher" Patent Double Jointed.)

INCLUDING TWO NOZZLES TO EACH MACHINE.

Showing Giants with Plain or Weighting Attachment.

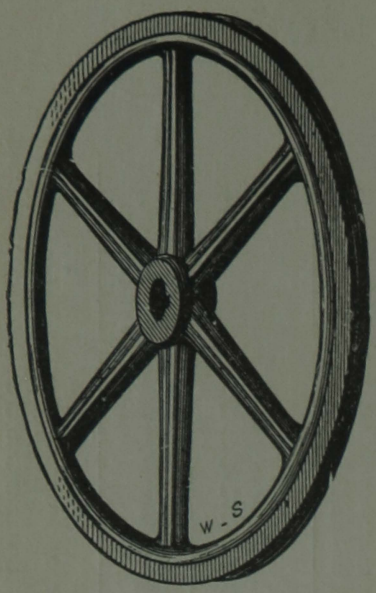
Numbers.	Inlets. Inches.	Outlets. Inches.	Diameter of Nozzle Butts Inside. Inches.	Sizes Nozzles. Inches.	Weights. Pounds.	Price.
1	7	5½	4	2 and 3	420	$ 125 00
2	9	7	5	3 and 4	520	175 00
3	11	7½	6	3 and 4	825	225 00
4	11	9½	7	4 and 6	1075	250 00
5	13	9½	8	5 and 6	1350	300 00
6	15	9½	9	6 and 7	1600	350 00
7	15	11	10	6 and 7	1850	400 00
8	18	11	10	7 and 8	1950	450 00

TABLE OF RIVETED HYDRAULIC PIPE.

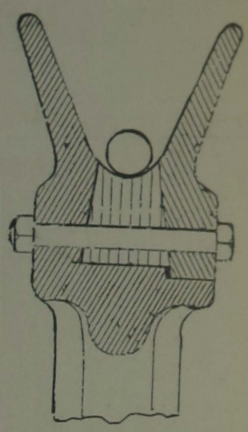
LIST OF DOUBLE RIVETED PIPE.

Diameter of pipe. Inches.	Area of Pipe. Inches.	Thickn's of Iron. Wire Gauge.	Head in feet the pipe will safely stand.	Cub. ft. of water pipe will convey per min. at vel. 3 ft. per second.	Weight per lineal foot. Pounds.	Price, per Foot.	Diameter of Pipe. Inches.	Area of Pipe. Inches.	Thickn's of Iron. Wire Gauge.	Head in feet the pipe will safely stand.	Cub. ft. of water pipe will convey per min. at vel. 3 ft. per second.	Weight per lineal foot. Pounds.	Price, per Foot.
3	7	18	400	9	2	$ 20	18	254	16	165	320	16½	$ 1 20
4	12	18	350	16	2¼	25	18	254	14	252	320	20½	1 40
4	12	16	525	16	3	35	18	254	12	385	320	27¼	1 90
5	20	18	325	25	3½	35	18	254	11	424	320	30	2 10
5	20	16	500	25	4¼	45	18	254	10	505	320	34	2 40
5	20	14	675	25	5	50	20	314	16	148	400	18	1 26
6	28	18	296	36	4¼	44	20	314	14	227	400	22½	1 54
6	28	16	487	36	5¾	50	20	314	12	346	400	30	2 10
6	28	14	743	36	7½	56	20	314	11	380	400	32½	2 25
7	38	18	254	50	5¼	50	20	314	10	456	400	36½	2 50
7	38	16	419	50	6¾	56	22	380	16	135	480	20	1 40
7	38	14	640	50	8½	63	22	380	14	206	480	24¾	1 70
8	50	16	367	63	7½	65	22	380	12	316	480	32¾	2 25
8	50	14	560	63	9½	75	22	380	11	347	480	35¾	2 45
8	50	12	854	63	13	94	22	380	10	415	480	40	2 80
9	63	16	327	80	8½	69	24	452	14	188	570	27¼	1 80
9	63	14	499	80	10¾	88	24	452	12	290	570	35½	2 35
9	63	12	761	80	14¼	1 06	24	452	11	318	570	39	2 70
10	78	16	295	100	9¼	72	24	452	10	379	570	43½	2 95
10	78	14	450	100	11¾	82	24	452	8	466	570	53	3 50
10	78	12	687	100	15¾	1 00	26	530	14	175	670	29¼	2 00
10	78	11	754	100	17½	1 25	26	530	12	267	670	38½	2 59
10	78	10	900	100	19¼	1 50	26	530	11	294	670	42	2 87
11	95	16	269	120	9¾	75	26	530	10	352	670	47	3 10
11	95	14	412	120	13	94	26	530	8	432	670	57¼	3 85
11	95	12	626	120	17¼	1 25	28	615	14	102	775	31¼	2 12
11	95	11	687	120	18¾	1 44	28	615	12	247	775	41¼	2 75
11	95	10	820	120	21	1 62	28	615	11	273	775	45	3 00
12	113	16	246	142	11¼	82	28	615	10	327	775	50¼	3 20
12	113	14	377	142	14	1 00	28	615	8	400	775	61¼	4 15
12	113	12	574	142	18½	1 38	30	706	12	231	890	44	2 90
12	113	11	630	142	19¾	1 50	30	706	11	254	890	48	3 15
12	113	10	753	142	22¾	1 69	30	706	10	304	890	54	3 50
13	132	16	228	170	12	90	30	706	8	375	890	65	4 30
13	132	14	348	170	15	1 12	30	706	7	425	890	74	4 75
13	132	12	530	170	20	1 50	36	1017	11	141	1300	58	3 80
13	132	11	583	170	22	1 65	36	1017	10	155	1300	67	4 30
13	132	10	696	170	24½	1 80	36	1017	8	192	1300	78	5 10
14	153	16	211	200	13	98	36	1017	7	210	1300	88	5 75
14	153	14	324	200	16	1 17	40	1256	10	141	1600	71	4 75
14	153	12	494	200	21½	1 57	40	1256	8	174	1600	86	5 60
14	153	11	543	200	23½	1 72	40	1256	7	189	1600	97	6 40
14	153	10	648	200	26	1 95	40	1256	6	213	1600	108	7 35
15	176	16	197	225	13¾	96	40	1256	4	250	1600	126	8 50
15	176	14	302	225	17	1 28	42	1385	10	135	1760	74½	5 05
15	176	12	460	225	23	1 75	42	1385	8	165	1760	91	6 20
15	176	11	507	225	24½	1 95	42	1385	7	180	1760	102	7 00
15	176	10	606	225	28	2 10	42	1385	6	210	1760	114	7 80
16	201	16	185	255	14½	1 05	42	1385	4	240	1760	133	9 00
16	201	14	283	255	17¼	1 20	42	1385	¼	270	1760	137	9 50
16	201	12	432	255	24¼	1 70	42	1385	3	300	1760	145	10 00
16	201	11	474	255	26½	1 85	42	1385	5/16	321	1760	177	12 00
16	201	10	567	255	29½	2 00	42	1385	3/8	363	1760	216	15 00

NOTE.—Where formed and punched including rivets, for mule packing or to facilitate transportation by other means, 30 per cent. may be deducted from prices above given. This list is based upon pipe coated inside and out with asphaltum, and is given for the purpose of enabling parties to make an approximate estimate of the cost. Net prices will be quoted on application.



SHEAVES.



We manufacture sheaves of all styles and sizes for hoisting or wire rope transmission, with solid or split rims, and with the groove lined with hard wood, rubber or tarred rope.

For heavy work we make the sheaves with the rims in two pieces; they are then turned true and smooth where the wood lining fits, and bolted together. The wood and the iron sides are then turned smooth.

These sheaves are extra heavy, with large strong bearings, and are balanced. The rope will not crush the wood out when used for heavy strains; and the sheaves can be run at high speed for transmission of power, without throwing out the filling.

SOLID RIM SHEAVES, ROPE LINED.

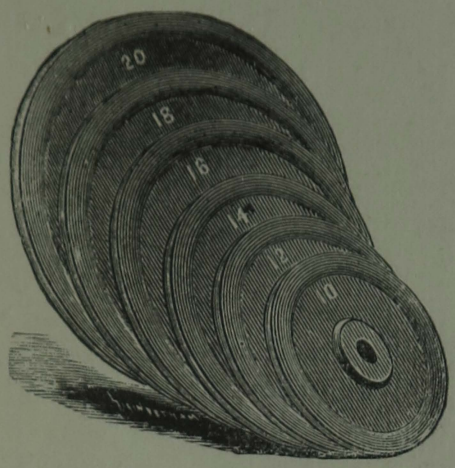
LIST.

SIZE.	WEIGHT—Pounds.			PRICE.		
Diameter. Inches.	Weight of Sheaves	Weight of Shaft.	Total.	Without Shaft or Boxes.	Without Boxes.	With Shaft and Boxes.
24	80	15	120	$12 00	$14 00	$19 00
30	150	15	185	15 00	17 00	22 00
36	200	25	275	20 00	22 00	28 00
42	310	30	415	27 00	30 00	36 00
48	425	35	550	33 00	36 00	43 00

EXTRA HEAVY, SPLIT, WOOD FILLED SHEAVES.

LIST.

SIZE.	WEIGHT—Pounds.			PRICE.		
Diameter. Inches.	Weight of Sheaves.	Weight of Shaft.	Total.	Without Shaft or Boxes.	With Shaft and Ball and Socket Boxes.	With Shaft and Rigid Boxes.
36	285	30	400	$30 00	$45 00	$38 00
42	350	40	525	37 00	54 00	45 00
48	505	50	700	45 00	62 00	56 00
60	870	70	1130	65 00	92 00	85 00
72	1225	85	1475	85 00	125 00	115 00



IRON SHEAVES.

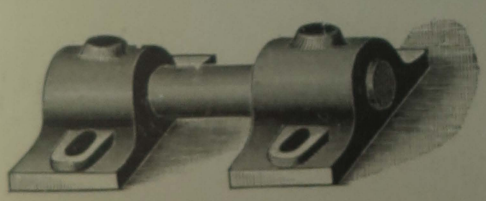
WITHOUT SHAFTS OR BOXES.

LIST.

Diameter of Sheaves. Inches.	For Rope Under 1¼ Inch Diameter.		For Rope Under 2 Inch Diameter.	
	Hole for Pin. Inches.	Price.	Hole for Pin. Inches.	Price.
6	1	$1 00	1¼	$1 25
7	1	1 25	1¼	1 55
8	1	1 50	1¼	1 85
9	1⅛	1 75	1⅜	2 15
10	1⅛	2 00	1⅜	2 50
11	1⅛	2 25	1⅜	2 80
12	1⅛	2 50	1⅜	3 10
13	1⅛	2 75	1⅜	3 40
14	1¼	3 00	1½	3 75
15	1¼	3 25	1½	4 05
16	1¼	3 50	1½	4 35
17	1¼	3 75	1½	4 65
18	1⅜	4 00	1¾	5 00
19	1⅜	4 30	1¾	5 35
20	1⅜	4 60	1¾	5 75
22	1⅜	4 90	1¾	6 10
24	1½	5 25	1¾	6 50

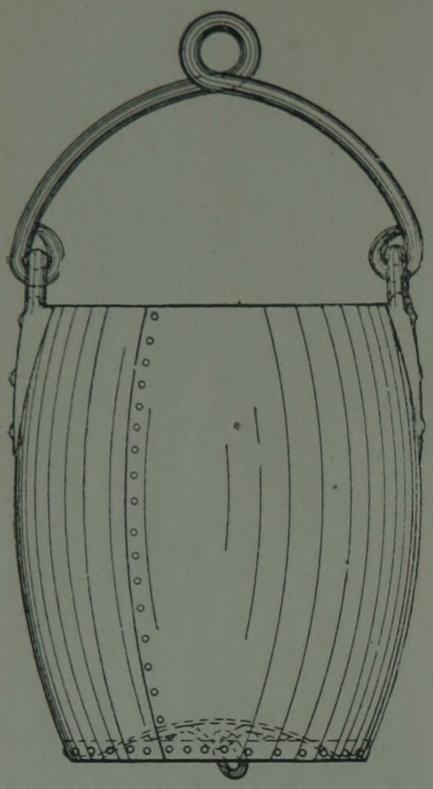
Unless otherwise ordered, sheaves are bored to standard sizes.

SHAFT AND BOXES FOR SHEAVES.



LIST.

1 1/16 inch	$3 40
1 1/16 inch	3 85
1 3/16 inch	4 30
1 5/16 inch	4 50
1 7/16 inch	5 50
1 1/8 inch	5 90
1 3/16 inch	6 50



STANDARD ORE BUCKETS.

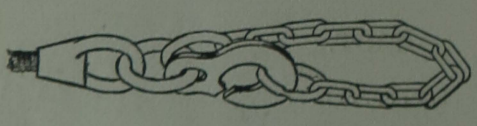
The sides and bottoms are made of good steel plate and pressed to shape by hydraulic pressure. By this means we make a perfect bucket with smooth, hard and springy surface, entirely free from the defects of ordinary buckets in which the common iron used is further injured by burning and too severe hammering. The rivets are counter-sunk, and the sides are of such shape that no part can catch upon the timbering or sides of the shaft. The bottom of the bucket is dished so that the ring to which the dumping chain is attached does not interfere with the bucket standing fairly on the ground.

LIST.

Numbers.	Height. Inches.	Diameters. Inside. Inches.			Thickness Steel.	Capacity.			Weight. Pounds.	Price.	Price for Strips on Sides. Extra
		Top.	Center.	Bottom.		Cubic Feet.	Av. Ore Lbs.				
1	30	21	24	17	No. 9	6½	750	Without band.	140	$23 00	$4 00
2	30	21	24	17	No. 11	6½	750	With band.	125	19 00	4 00
3	32	24	27	21	No. 8	9	1100	Without band. With band.	185 195	28 00 29 50	6 00
4	37	28	34	23	¼	15	1700	Without band. With band.	385 410	58 00 62 00	8 00
5	37	24	28	22	¼	11	1300	Without band.	305	45 00	7 00
6	24	20	22	16	No. 14	4½	500	With band.	60	12 50	3 00
7	19	17	19	14	No. 16	2½	300	With band.	35	11 00	2 00
10	40	27	32	23	¼	15½	1800	With band.	400	58 00	8 00

We are prepared to make special buckets of any size and shape desired.

SAFETY HOOKS AND CHAINS.

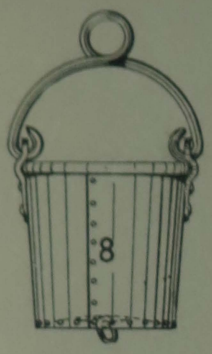


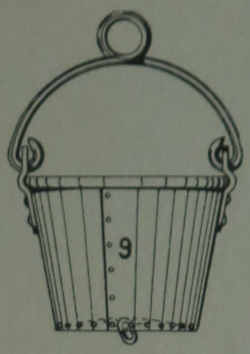
Our Safety Hooks are made of steel and tested proof chain. The chain passes through the eye of the bail of the bucket, and the link in the end hooks into the hook, and can only be unfastened by turning crossways of the hook at a certain place.

LIST.

For ½ in. rope, tested to 7,000 pounds ..... loose, $6 00; fastened, $6 75
For ⅝ and ¾ in. rope, tested to 10,000 pounds ..... loose, 7 00; fastened, 8 00
For ⅞ and 1 in. rope, tested to 15,000 pounds ..... loose, 8 00; fastened, 9 00

They are all carefully tested in a hydraulic press.





HAND WINDLASS BUCKETS.

Numbers.	Height. Inches.	DIAMETER.		Capacity. Cubic Feet.	Weight. Pounds.	Price.
		Top. Inches.	Bottom. Inches.			
8	16	16	14	1¾	28	$3 60
9	15	19	14	2	28	3 60

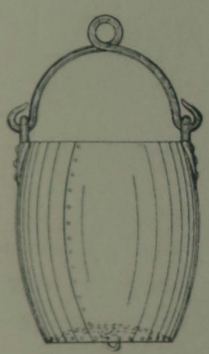


Plate 25.

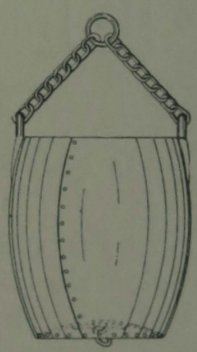


Plate 26.

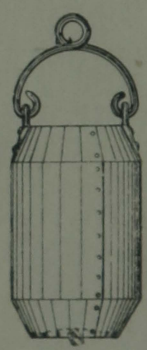


Plate 27.

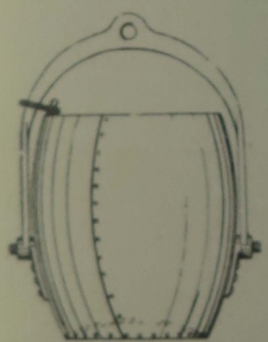


Plate 28.

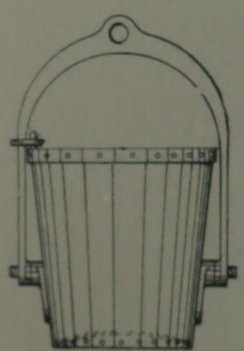
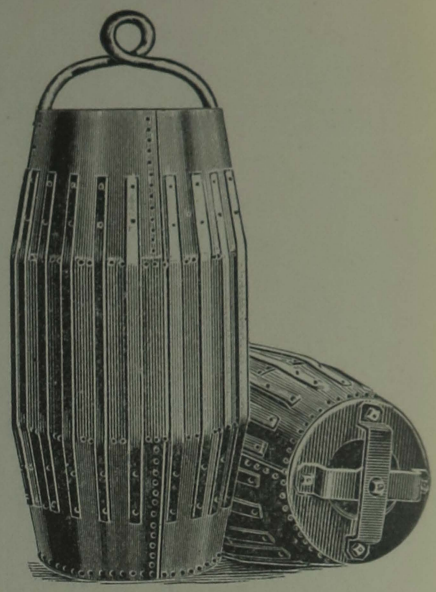


Plate 29.

Besides our Standard Buckets we build buckets with the different styles of bails and of the various forms shown in plates of any size desired.

PRICES ON APPLICATION.

WATER BUCKETS.

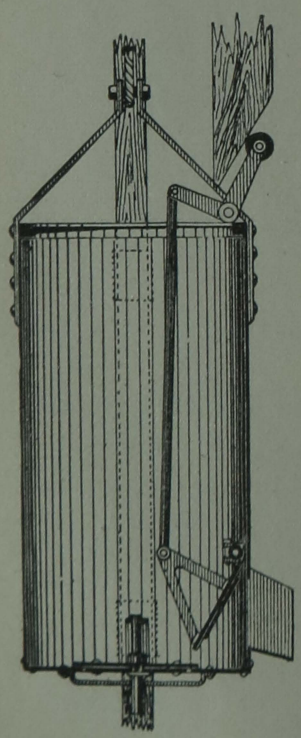


Our Water Buckets are of the most approved pattern. Wrought iron strips are riveted to the sides, providing wearing surfaces when used in inclined shafts, and making the sides of the bucket perfectly smooth, avoiding all possibility of its catching on the timbering of the shaft. The bucket has a stiff bail, and a valve in the bottom, as shown in the cut. The stem of the valve projects below the bottom and automatically opens the valve when it touches the bottom of the shaft and closes it again as soon as it is raised.

LIST.

Capacity.....gallons	40	60	75	100	125	150	175	200	250	300	350
Length .....inches	36	44	48	52	56	60	64	66	69	72	76
Diameter, mid.....inches	20	22	24	26	28	30	32	33	36	38	40
Diameter, ends.....inches	16	18	19	21	23	24	25	26	28	30	32
Weight.....pounds	..	250	300	350	400	520	550	700	800	850	900
Price	$30	$50	$60	$70	$80	$95	$110	$125	$135	$145	$155

AUTOMATIC BAILING TANKS.



These Tanks are arranged to run in cage guides and fill and empty automatically. When lowered into the sump the valves open and the tank fills with water. When raised to where the water is to be discharged, rollers on the bell-crank arms engage with an incline guide, throwing them out and opening the side valve as shown. A very large quantity of water can be handled by these tanks. They are built to order to suit guides.

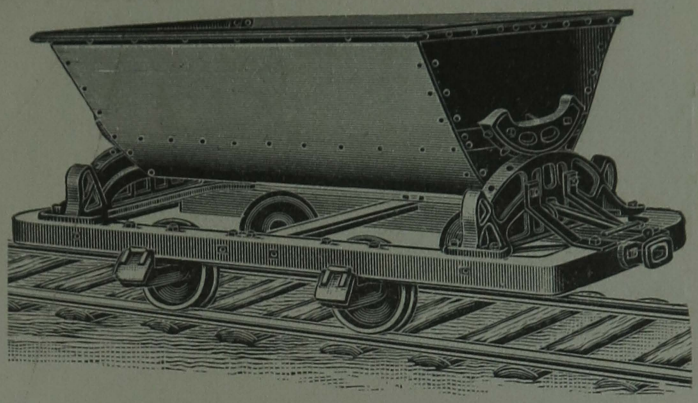
LIST.

Capacity. Gallons.	Approximate Weight. Pounds.	Price.
150	.....	.....
200	.....	.....
250	.....	.....
300	.....	.....
350	.....	.....
400	.....	.....
500	.....	.....
600	.....	.....
700	.....	.....
800	.....	.....

PRICES ON APPLICATION.

SIDE DUMPING ROCKING BASKET CARS.

This car is designed for handling stone, coal, ore, coke, etc., and is of iron or steel construction. Will dump on either side. The body is rigidly held in an upright position by means of a lever resting between two lugs; upon raising the lever the body is instantly released. By a peculiar construction of the rockers at each end of car, the body is prevented from becoming detached from the trucks, an accident which has happened to cars of this style but of other manufacture.

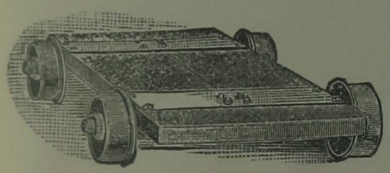


LIST.

Capacity. Cubic Feet.	Gauge. Inches.	Height from Track. Inches.	Width over All Inches.	Length over All. Feet.	Inches.	Diam.of Wheels. Inches.	Weight. Pounds.	Price.
16	18 to 24	.....	.....	.....		10 to 12	1200	$133 00
20	18 to 24	42 to 48	48 to 54	7	0	12	1500	138 00
27	24	50	54	9	4	12 to 14	2000	200 00
36	24 to 30	58	60	9	6	14 to 18	3700	266 00

BUCKET CARS.

A small car which is quite useful for handling buckets when no ore cars are used.



LIST.

Car, 6-inch wheels, 18-inch gauge	$ 8 00
Car, 8-inch wheels, 18-inch gauge	10 00
Car, 10-inch wheels, 18-inch gauge	12 00

MINING CAGES AND CHAIRS.

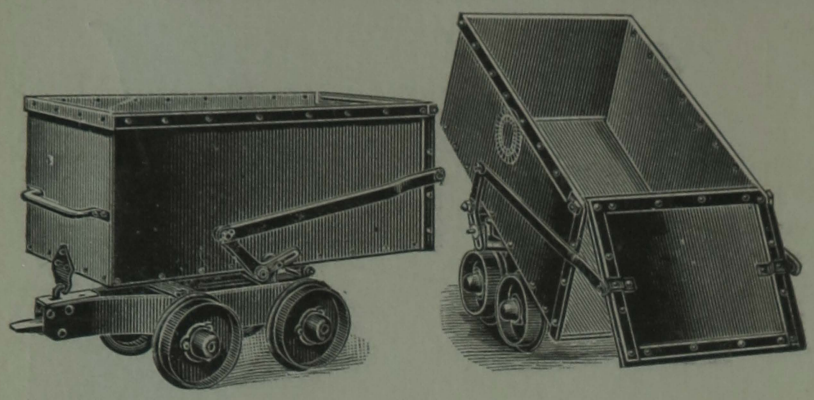
Our Mining Cages and Chairs are built entirely of Norway iron and steel. They are light, stiff and durable. We are prepared to build them of any size or capacity. In the list below is given the usual sizes used in Colorado mines. As each cage has to be built to suit the shaft, the dimensions given can be varied several inches without extra cost.

LIST.

DUTY.	Size Platform. Feet.	Capacity. Pounds.	Weight. Pounds.	Price.
Gold or Silver Mines	3 x 4	2000	500	$150 00
Gold or Silver Mines	3 x 4	4000	750	175 00
Gold or Silver Mines	3 x 4	6000	850	200 00
Coal Mines	4 x 6	4000	1100	225 00
Coal Mines	4 x 6	6000	1400	250 00

Landing Chairs, small	$50 00
Landing Chairs, large	65 00

THE DAVIS AUTOMATIC ORE CARS.



The mechanism of the Davis Automatic Car consists of a simple and positive arrangement of levers which automatically open the car door when the box is raised for dumping and close and lock the door when the box is returned to a horizontal position.

Absolute certainty of action is assured by the permanent connection of the levers to the door.

The door begins to open as the car box is raised and is completely open when the box stands at an angle of twelve degrees from the track.

The permanent connection of the levers to the door avoids the trouble which occurs with doors secured by hooks which fail to act at the right time, or which unlatch from the jar of ore against the door when loading. By a new method of construction we have perfectly protected the door hinge from injury from any cause.

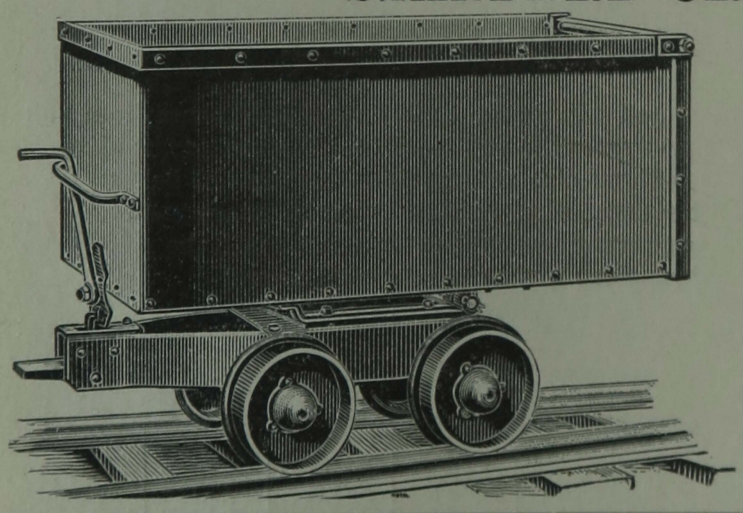
LIST.

Nos.	Size of Box.			Thickness of Steel		Size Axles. Inches.	Size Wheels. Inches.	Capacity. Cubic Feet.	Weight.	Price.
	Length. Inches.	Width. Inches.	Depth. Inches.	Sides.	Bottom.					
2	44	24	20	No. 14	No. 12	1¼	10	13	425	$36 00
3	48	24	20	No. 10	No. 8	1¼	10	14	525	40 00
4	48	24	20	3/16 in.	¼ in.	1½	10	14	590	53 00
5	48	24	24	3/16 in.	¼ in.	1½	10	16	650	60 00

Nos.
2. False bottoms $5 00
3. False bottoms 5 00

Nos.
4. False bottoms $6 00
5. False bottoms 6 00

STANDARD ORE CARS.

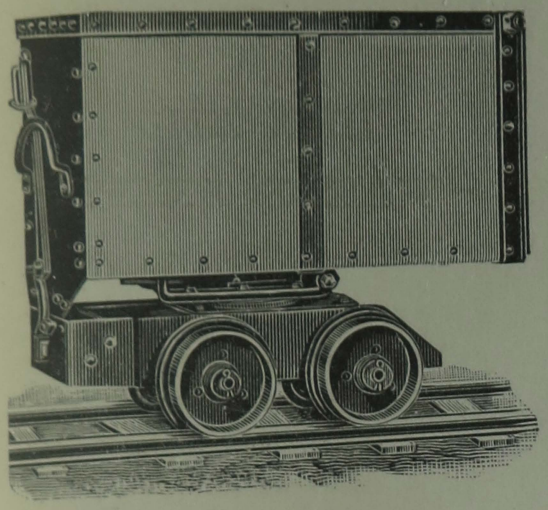


Great care is exercised in the construction of our mining cars, and the best possible results are obtained by proper distribution of the weight. They are built by skilled workmen, and are the best low-priced, high-grade mining cars manufactured. The beds are made of the very best quality of sheet steel. The wheels are cast iron, and supplied with self-oiling, dust-proof caps. All other parts are made of forged steel or iron. The cars are all provided with turntable so they can be dumped at either side or end. The cars carried in stock are for 18-inch track, but they can be furnished for any gauge of track desired.

The following are standard sizes: Nos. 1. 2, 3 and 4 being always in stock.

Numbers.	Size of Box.			Thickness of Steel.		Size Axles. Inches.	Size Wheels. Inches.	Capacity. Cubic Feet.	Weight. Pounds.	Price.
	Length Inches.	Width. Inches.	Depth. Inches.	Sides.	Bottom.					
1 (ex. light)	44	24	20	No 14	No. 12	1¼	10	13	375	$24 00
2 (light)	44	24	20	No. 14	No. 12	1¼	10	13	410	30 00
3 (medium)	48	24	20	No. 10	No. 8	1¼	10	14	510	36 00
4 (heavy) ..	48	24	20	3/16 in.	¼ in.	1½	10	14	570	42 00
5.....	48	24	24	3/16 in.	¼ in.	1½	10	16	610	.....
6.... ...	48	30	24	¼ in.	¼ in.	1½	10	20	685	.....
7.....	54	30	24	¼ in.	¼ in.	1¾	12	23	750	.....
8.....	.....	.....	.....	.....	.....	.....	....	... .	....	.....

Nos. 2 and 3 have false bottoms.



LEADVILLE ORE CARS.

LIST.

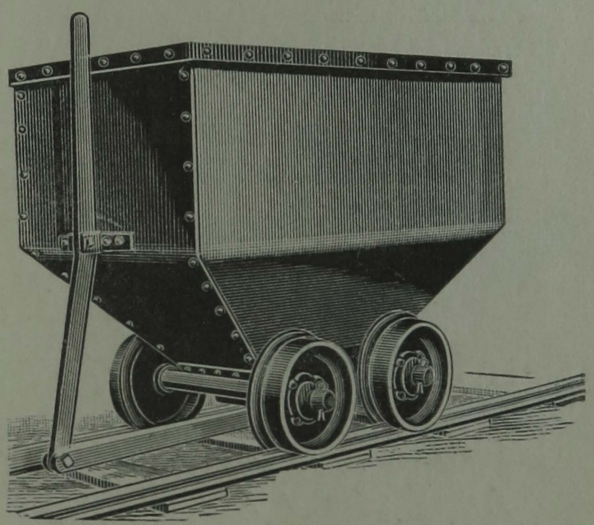
	Thickness of Steel.		Size of Box.			Weight Lbs.	Price.
	Sides	Bottom	Length Inches.	Width. Inches.	Depth. Inches.		
Heavy..	¼ in.	¼ in.	42	24	24	800	$70 00
Medium	No. 10	$\frac{3}{16}$ in.	42	24	24	625	60 00

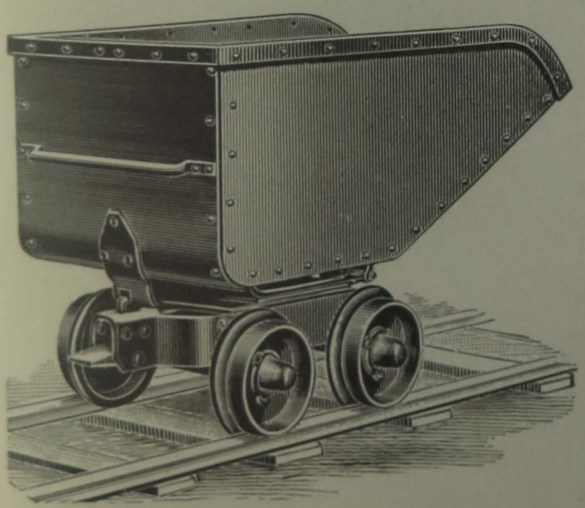
BOTTOM DUMP CARS.

A Car that dumps between the rails. These cars are used in stamp mills and smelters, to feed reverberatory and revolving furnaces, coke ovens and automatic stokers. They are made of various sizes to suit requirements.

LIST.

15 cubic ft. capacity, weight 425 lbs.. $46 00
20 cubic ft. capacity, weight 525 lbs.. 65 00

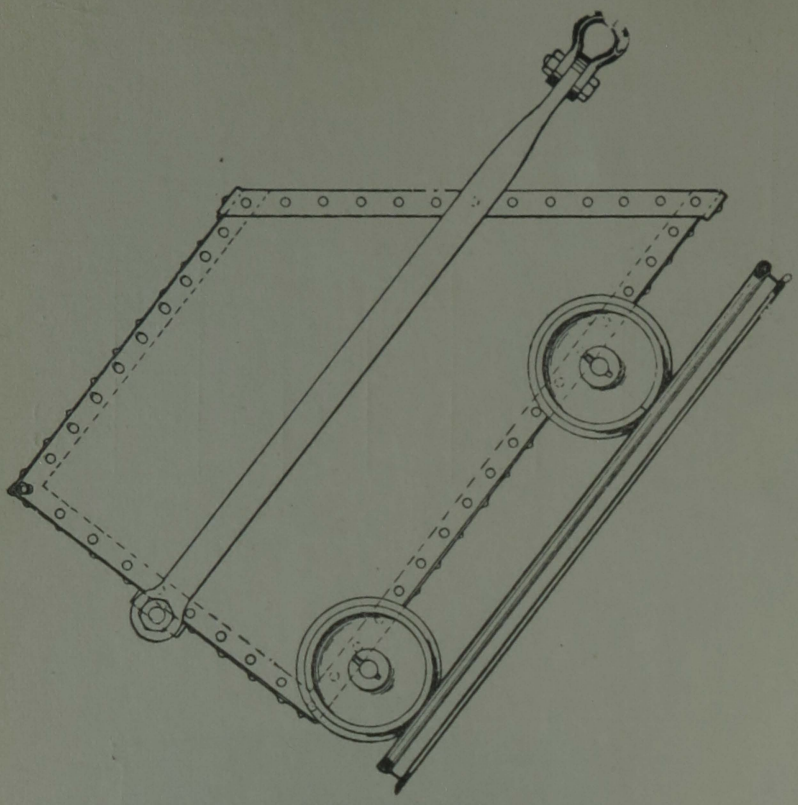




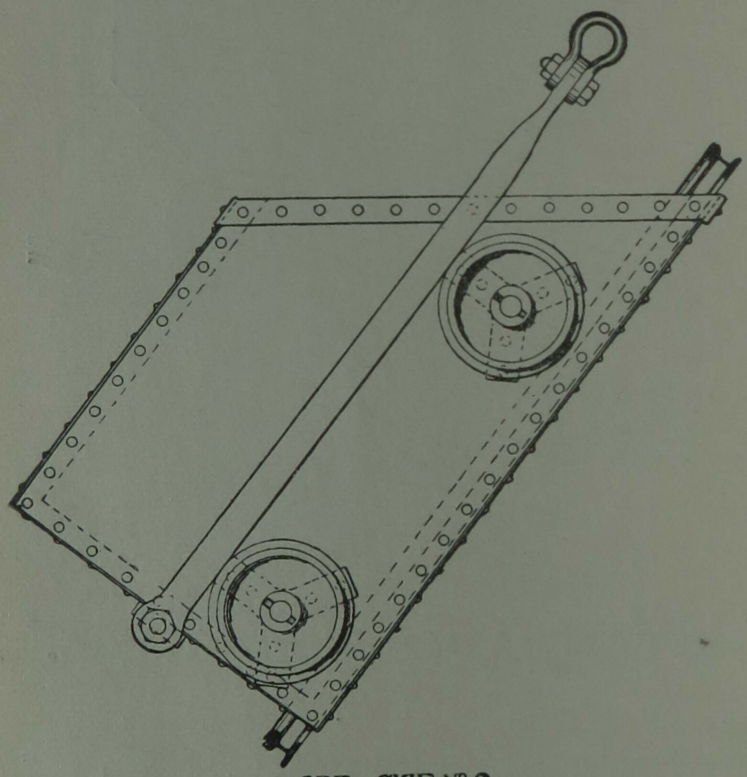
STANDARD SCOOP CARS.

LIST.

	Thickness of Steel.		Size of Box.			Weight Lbs.	Price.
	Sides	Bottom	Length Inches.	Width. Inches.	Depth. Inches		
Heavy..	$\frac{3}{16}$ in.	¼ in.	54	24	20	500	$42 00
Medium	No. 10	No. 8	54	24	20	400	32 00



ORE SKIP No 1.



ORE SKIP No 2

ORE AND WATER SKIPS.

We manufacture Ore and Water Skips of all sizes for vertical or inclined shafts, and arranged for automatic dumping.

Skip No. 1 is the style generally used in large shafts and inclines, but where room is limited Skip No. 2 is preferred.

When Skips are nsed for hoisting water a valve is placed in the bottom, which opens as soon as it touches water.

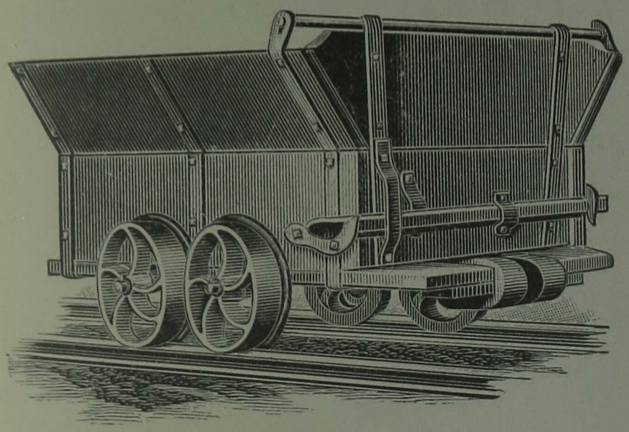
We do not carry Skips in stock, as they have to be made to fit the incline, but we are prepared to furnish them of any size or style.

Our Skips are built entirely of Swedish iron and steel plate, and the wheels are of best chilled iron.

LIST.

Capacity of Skip in Cubic Feet.	Thickness of Steel in Box. Inches.	Weight, Approximate. Pounds.	Price Skip No. 1.	Price Skip No. 2.	Extra for Water Valve.
10	3/16	550	$ 60 00	$ 75 00	$10 00
15	1/4	800	80 00	100 00	10 00
20	1/4	1050	100 00	125 00	15 00

PIT CARS.



PRICES ON APPLICATION.

We make these cars complete, of any size or style desired, open end or with door, with or without brake, and with woodwork of oak or pine.

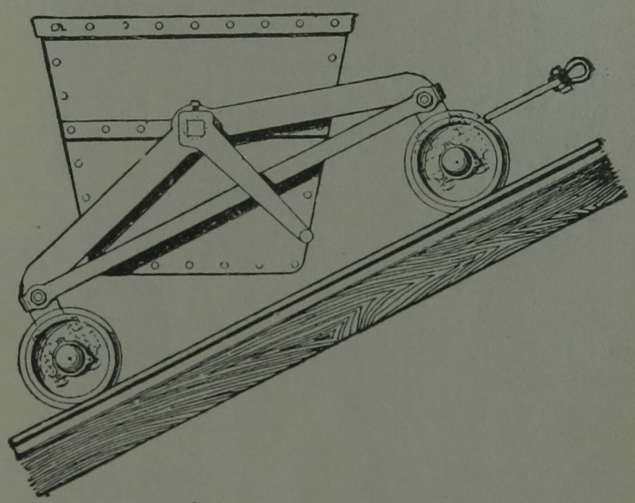
In asking for prices, the following information is necessary:

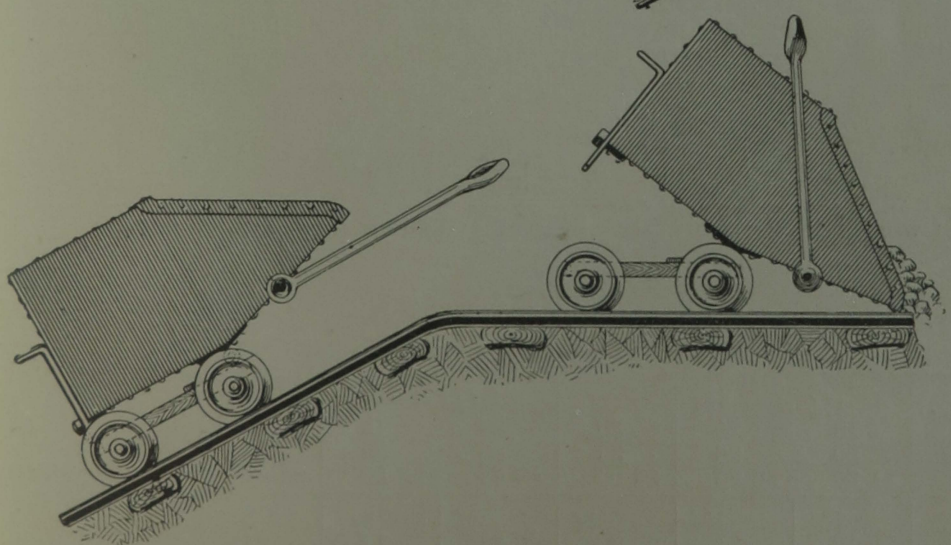
Dimensions of belt or binder bar.
Diameter of wheels.
Gauge of track.
Size of axles and whether round or square.
Size and style of draw bar.
Length of car in clear.
Length of bottom over bumpers.
Thickness of lumber in bottom.
Thickness of lumber in sides.
Oak or pine.
Distance wheels are placed apart, center to center.
If brake is wanted, give description of same.

AUTOMATIC DUMP CAR.

An automatic dump car used on incline shafts and tramways. It takes the place of the ordinary ore skip with the advantage that it can be dumped anywhere along the line.

PRICES ON APPLICATION.

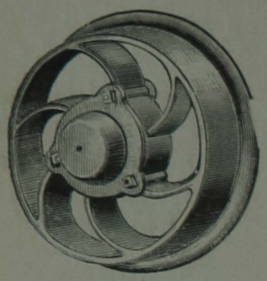




COMBINED SKIP AND CAR.

For inclines and horizontal track; suitable for small mines. The car can be hauled up incline by engine or whim, uncoupled and treated as ordinary car. Can be made with turntable if desired.

Capacity 10 cubic feet, weight 325 pounds, no turntable	Price, $33 00
Extra for valve in bottom and water tight, no turntable	Price, 5 00
Extra for turntable	Price, 5 00

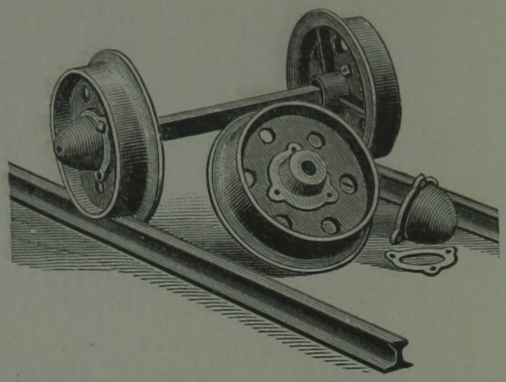


COAL CAR WHEELS.

PER SET OF FOUR. (AXLES EXTRA.)

LIST.

Size of Wheels, Inches...	12	14	16	18
Weight, Pounds	200	245	....	....
Price	$8 50	$10 50	....	....

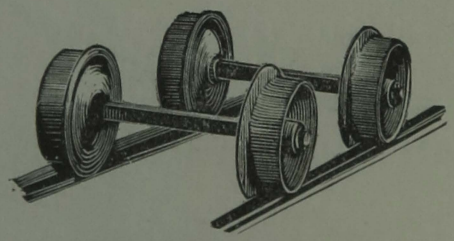


SELF-OILING CAR WHEELS.

PER SET OF FOUR. (AXLES EXTRA.)

LIST.

Size of Wheels, Inches	6	8	10	12	14
Weight, per Set, Pounds	70	92	126	196	230
Price	$4 25	$4 75	$5 80	$9 00	$10 20



PLAIN WHEELS.

PER SET OF FOUR. (AXLES EXTRA.)

LIST.

Size of Wheels, Inches	6	8	10	12	14
Weight, per Set, Pounds	60	82	116	186	216
Price	$2 80	$3 65	$5 00	$8 00	$9 25

All sizes of wheels listed above carried in stock and orders filled without delay.

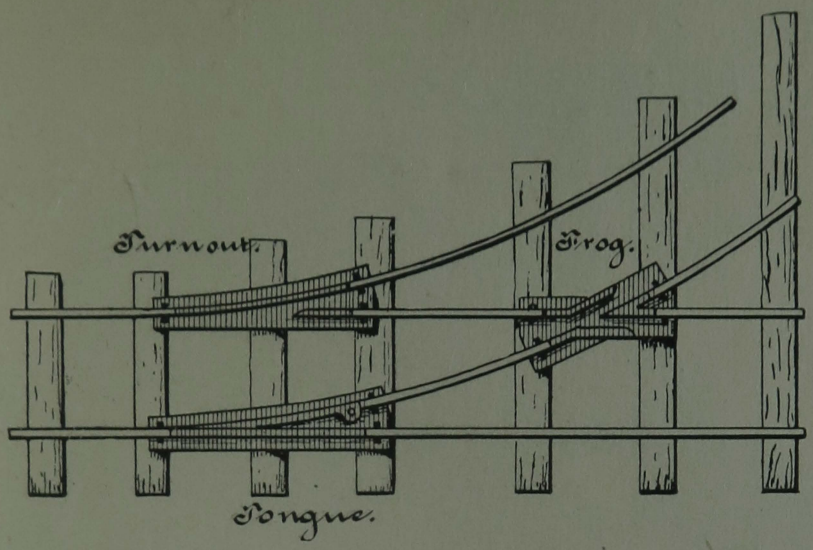
AXLES.

PER SET OF TWO.

LIST.

Size Square, Inches ...	1¼	1¼	1¼	1¼	1½	1½	1½	1½
Tread, Inches	18	24	30	36	18	24	30	36
Weight, Pounds.....	20	26	35	40	30	37	46	54
Price.....	$1 80	$2 25	$3 00	$3 65	$2 50	$3 00	$3 35	$3 60
Size Square, Inches ...	1¾	1¾	1¾	1¾	2	2	2	2
Tread, Inches	18	24	30	36	18	24	30	36
Weight, Pounds	45	55	67	80	55	70	85	100
Price.....	$4 75	$5 50	$6 60	$7 85	$6 00	$7 25	$7 75	$8 25

All sizes 1¼ inch and 1½ inch axles carried in stock and orders filled without delay.



SWITCHES.

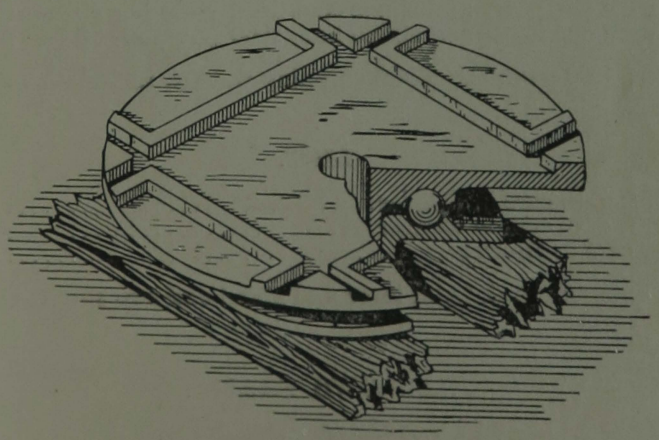
We can furnish Turnouts, Tongues and Frogs suitable for mine switches, as illustrated above, for 8, 10 and 12-pound rail. Radius curve, 10 feet; gauge of track, 18 to 30 inches.

LIST.

Size Rail. Pounds.	Tongue.	Turnout.	Frog.	Complete.
8	$3 50	$2 50	$1 75	$ 7 75
10	4 00	3 00	2 00	9 00
12	5 00	3 50	2 50	11 00

TIPPLES.

Tipples of various sizes and designs to suit all conditions.
Prices on application.

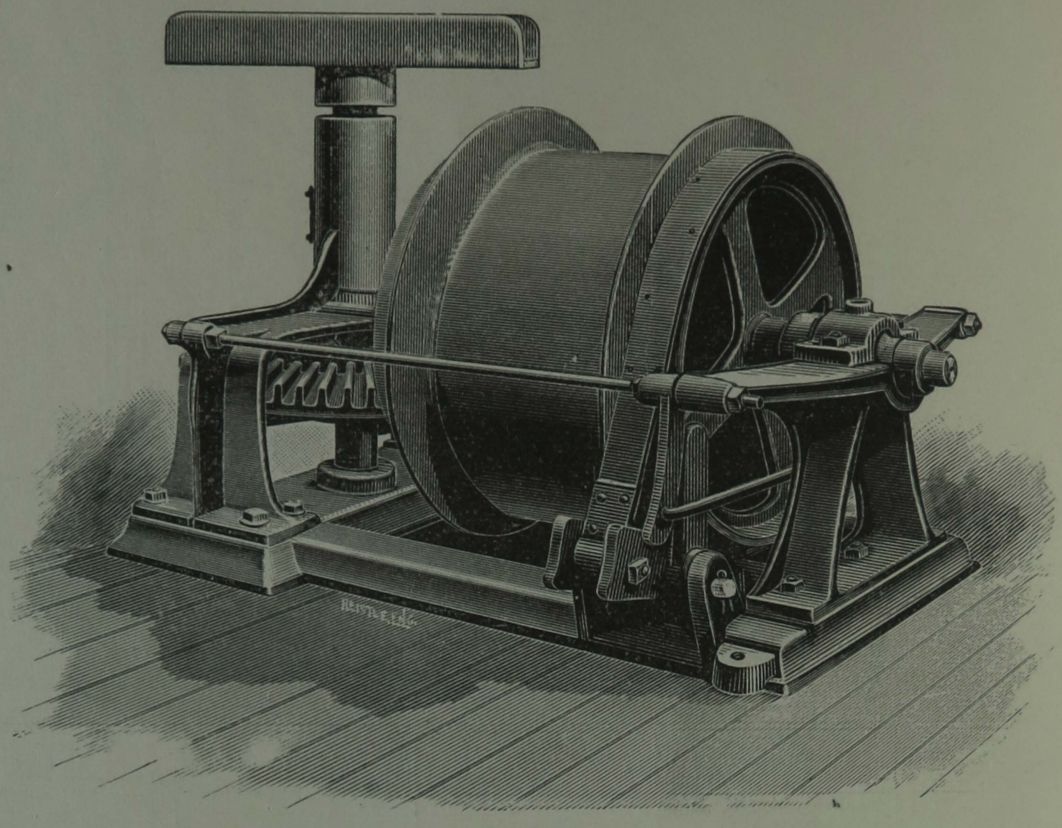


TURNTABLES.

Our Turntables are ball-bearing, easy running, no trouble putting in place, no journal friction, self contained.

LIST.

18-inch gauge.....Price $20 00
24-inch gauge.....Price 25 00
30-inch gauge.....Price 35 00



IMPROVED HORSE WHIMS.

WITH SAFETY BRAKE.

We carry in stock the following sizes of Whims:

No. 1—Capacity with one horse and single line, 800 pounds, 75 feet per minute.
No. 2—Capacity with one horse and single line, 500 pounds, 125 feet per minute.
No. 3—Capacity with one horse and single line, 1000 pounds, 60 feet per minute.
No. 4—Capacity with one horse and single line, 1500 pounds, 45 feet per minute.
No. 5—Capacity with one horse and single line, 2000 pounds, 30 feet per minute.

Weight of machine, 1200 pounds. Total shipping weight, including sweep, levers and sheaves, 1400 pounds.

LIST.

Price, Numbers 1 and 2, f. o. b. cars in Denver $100 00
Price, Numbers 3 and 4, f. o. b. cars in Denver 125 00
Price, Number 5, f. o. b. cars in Denver 150 00

Including sweep, extension rod, hand lever and stand and two sheaves and boxes. Buckets and rope extra.

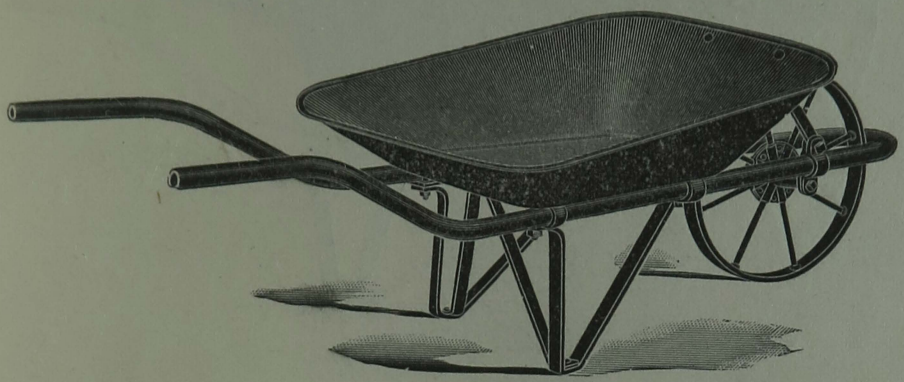
GALLOWS FRAME.

2 pieces 4 x 6 inches ..... 16 feet long
2 pieces 3 x 6 inches ..... 16 feet long
2 pieces 3 x 10 inches ..... 26 feet long
4 pieces 3 x 12 inches ..... 5 feet 2 inches long
4 pieces 2 x 12 inches ..... 6 feet long
2 pieces 2 x 6 inches ..... 4 feet long
4 pieces 2 x 4 inches ..... 1 foot long
4 machine bolts, ¾ inch x 6 feet 11 inches, with cast washers.
4 machine bolts, ⅝ inch x 6 inches, with washers.
4 machine bolts, ½ inch x 5 inches, with cast washers.

Price, complete, framed and painted $34 00

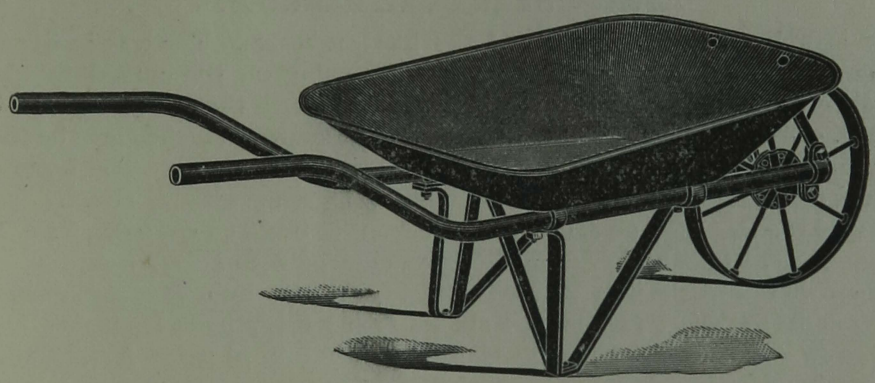
THE "COLUMBUS" TUBULAR STEEL BARROWS.

TRAYS PRESSED FROM SOLID PLATES OF STEEL.



STEEL DIRT BARROWS.

No 4, With Wheel Guard.



STEEL MINING BARROWS.

No. 4, Without Wheel Guard.

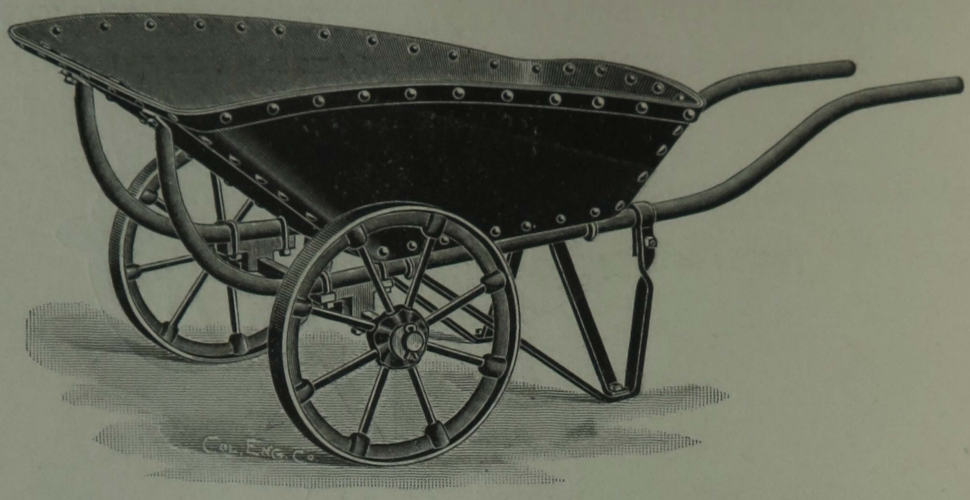
LIST.

Numbers.	Capacity. Cubic Feet.	Gauge Steel in Trays.	Wheel Number.	Weight. Pounds.	Price.
4	3	15	14	70	$10 75
4½	3	14	14	75	11 50
5	4	14	14	82	13 50
6	3	14	15	80	12 25
7	4	14	15	87	14 25
8	3	12	15	90	14 00
9	4	12	15	97	16 00
10	6	13	15	112	20 00
12	6	15	15	100	18 50

LEWIS' STEEL SPOKE WHEELS.

LIST.

Kind.	Diameter. Inches.	Tire. Inches.	Spokes. Round.	Hub Length. Inches.	Axle. Inches.	Weight. Pounds.	Price.
No. 13	16½	1½ x ¼	⅜	6	½	9	.....
No. 13x	16½	1⅜ x ⅜	⅜	6	½	11	.....
No. 14	16½	1½ x ⅜	½	6	½	14	.....
No. 15	16½	1¾ x ⅜	½	7	⅝	15½	.....
No. 15x	19	1¾ x ⅜	½	7	⅝	18	.....



"COLUMBUS" TUBULAR STEEL WHEELBARROW.

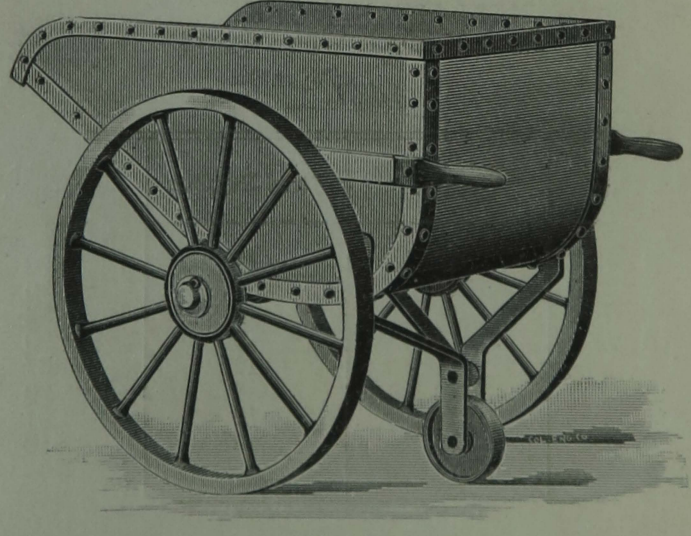
TWO-WHEEL COAL BARROW.

This Barrow is well made and will stand the hardest usage. The tray is the most approved shape for the purpose, and when tipped forward and resting on the curved tubular frame, every particle of coal slides out easily, so that the load is dumped with the least labor and in the quickest time. STEEL TRAY.—Size: Bottom, 20½x21 inches. Top measures 44 inches long by 40 inches wide at wheel end, by 31 inches wide at handle end. Greatest depth, 14½ inches. The bottom and front of tray is No. 10 gauge steel, sides and back No. 13, and put together with $\frac{5}{16}$ rivets.

TUBULAR HANDLES.—1¼-inch pipe, curved up to front of tray and riveted. Axle, 1½ inch square by 38 inches long. Legs, 1 inch half-oval iron and cross braced with 1¼x$\frac{5}{16}$ iron.

WHEELS.—Improved wrought iron pattern with heavy cast hub, 20 inches diameter; tire, 2x⅜ nches; double wrought spokes, 1⅛x¼ inch; hub, 3½ inches long; bore, 1¼ inches.

Weight of Barrow complete, 220 pounds. Capacity, even full, 10 cubic feet. Capacity, even full nut coal, 525 pounds.



No. 0.

CHARGING BARROW.

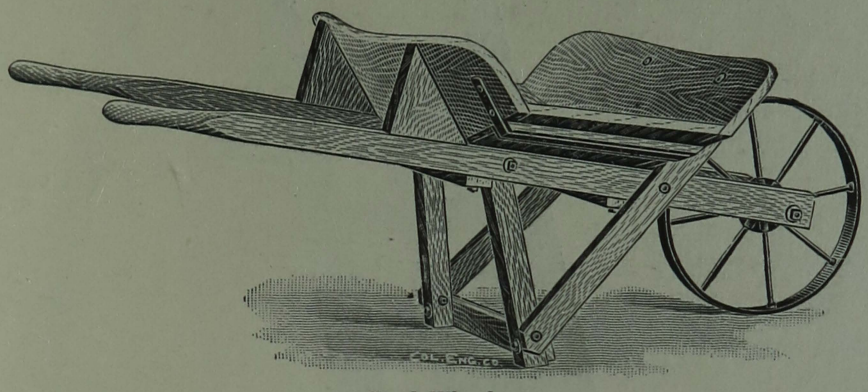
WHEELS WITH PLAIN BEARINGS.

Box.—Bottom, No. 10 steel. Sides, No. 12 steel. Bottom re-enforced inside and mouth outside with No. 12 steel. Corners, angle steel 2x2x¼ inches, firmly riveted to plates. Solid iron band riveted entirely around top edge and mouth of barrow.

WHEELS.—Best wrought iron with heavy grey cast hub; diameter, 32 inches; tire, 2 inches in width by 1 inch thick; spokes, ⅞-inch round, forged shoulders, fitted against inside of tire; ends extend through tire and are countersunk riveted on outside; drag wheel, 8 inches diameter, 2½-inch face.

PRICES ON APPLICATION.

"COLUMBUS" WHEELBARROWS.

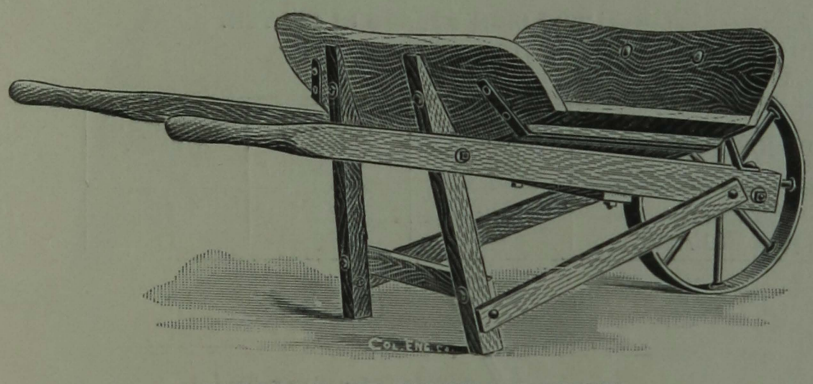


Steel Wheel.

RAILROAD.

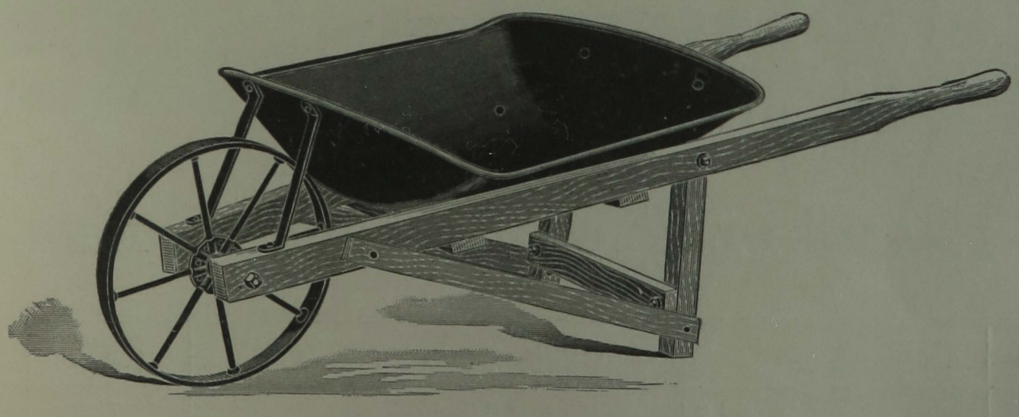
Bolted, with Wood Wheel ....Per Dozen.....

Bolted, with Steel Wheel.....Per Dozen.....



"JUMBO" OR EXTRA LARGE.

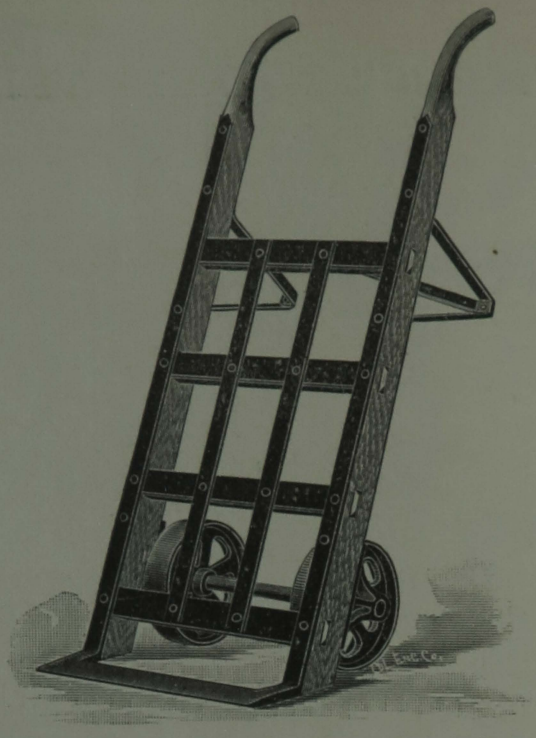
Capacity 9 cubic feet..... Per Dozen.....



PAN-AMERICAN.

Bolted, with Steel Wheel and Seamless Steel Tray, capacity 4½ cubic feet .....Per Dozen .....

PRICES ON APPLICATION.

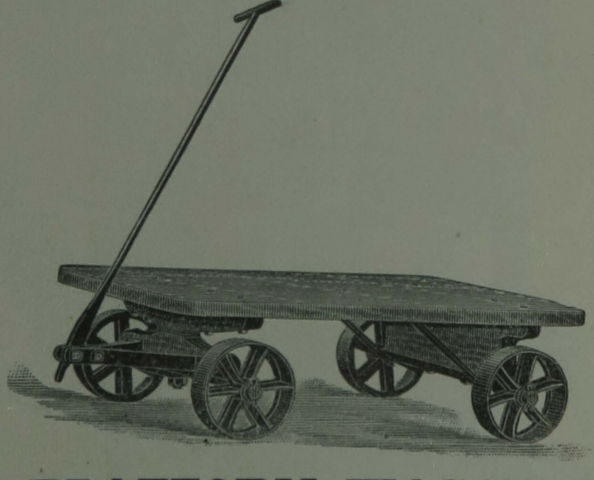


RAILROAD TRUCKS.

TWO IRON STRAPS IN CENTER.

LIST.

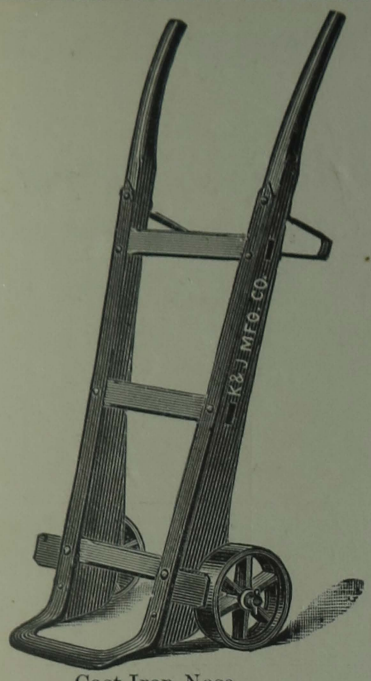
Numbers.	DESCRIPTION.	Length of Handles. Inches.	Width of Truck. Inches.	Diameter of Wheels. Inches.	Weight. Pounds.	Price.
157	Railroad.	60	24	11	120	$11 10
158	Extra Railroad.	60	24	11	125	12 50



FRAME PLATFORM WAGON TRUCKS.

LIST.

Numbers.	PLATFORM.	Wheels. Inches.	Price.
1	2 feet 6 inches x 3 feet 6 inches.	7½	$11 50
2	3 feet x 4 feet.	7½	12 30
3	3 feet x 5 feet.	9	17 45
4	3 feet x 5 feet.	11	19 40
5	3 feet x 5 feet. Extra heavy.	14	24 70
10	Grain Wagon, with cleats across ends, otherwise same as No. 5.	....	25 20



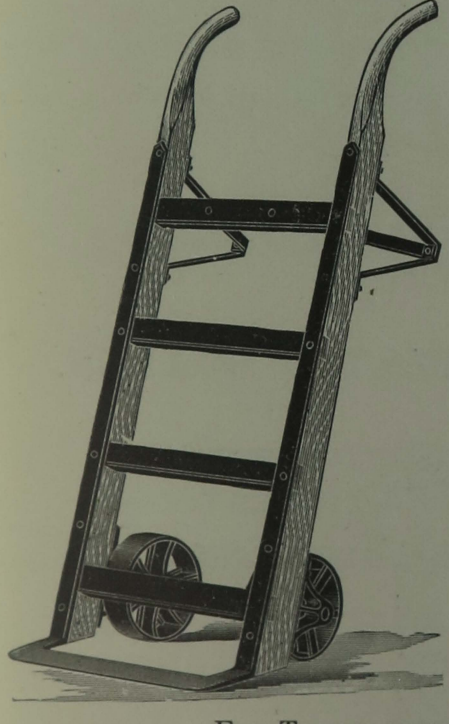
Cast-Iron Nose.

BAG TRUCKS.

LIST.

Numbers.	DESCRIPTION.	Length of Handles. Inches.	Width of Truck. Inches.	Diameter of Wheels. Inches.	Weight. Pounds.	Price.
1	Bag Truck.....	42	14	6	22	$2 70
1	Hotel, bent Handles, Rubbered Wheels	52	20	6½	38	7 00
2	Hotel, bent Handles, Rubbered Wheels	52	20	7½	48	9 00

HALF AND FULL-IRONED TRUCKS.



LIST.

Numbers.	DESCRIPTION.	Length of Handles. Inches.	Width of Truck. Inches.	Diameter of Wheels. Inches.	Weight. Pounds.	Price.
1	Store Truck, Half-Ironed	47	19	6½	34	$ 4 20
1	Store Truck, Full-Ironed	47	19	6½	38	4 80
2	Store Truck, Half-Ironed	52	20	7½	49	5 40
2	Store Truck, Full-Ironed	52	20	7½	54	6 00
3	Store Truck, Half-Ironed	56	22	9	66	7 20
3	Store Truck, Full-Ironed	56	22	9	72	8 50
4	Store Truck, Full-Ironed	60	24	10	115	10 60
..	Store Truck, Half-Ironed	..	..	..	...	9 00

For Trucks with Rubbered Wheels, add to List as Follows:

Size of Wheels ....Inches,	6	6½	7½	8	9
Add to List.....Each Truck,	$3 75	$4 00	$4 50	$5 75	$7 50

RUBBERED WHEELS.

LIST.

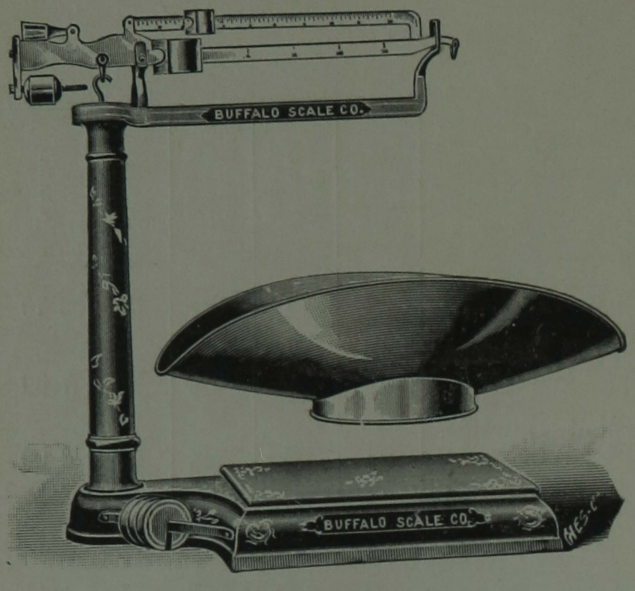
Size of Wheels .....Inches,	6	6½	7½	8	9
Price.....Per Pair,	$4 75	$5 00	$5 75	$7 75	$9 50

HANDY TRUCK.

Length of handles, 3 feet 10 inches; width of nose, 12 inches; width of upper bar, 17 inches; diameter of wheels, 6 inches; weight, 25 pounds. It is the most convenient truck in the market for general use and for handling small boxes, kegs or packages.

Price $2 50

BUFFALO PATENT BOSTON PLATFORM SCALES.



Gold Medal, New Orleans, 1884-5.
First Premium, Cincinnati Centennial, 1888.
Gold Medal, World's Fair, Chicago, 1893.

Size of platform, 13½ inches long, 10 inches wide.
Pillar, 18 inches high.

Nickel plated beam and poises.
Double beam, marked on both sides.

LIST.

New Numbers.	Capacity. Pounds by Ounces	Scoop.	Price.
75	250	Large Seamless Tin Scoop.	$24 00
76	250	Large Seamless Brass Scoop.	25 00

Beautifully Finished.

Tin funnel scoop for this scale, $1.00 extra.
Brass funnel scoop for this scale, $1.50 extra.
Beam is set back so that it does not interfere with weighing very high bags or packages. Notice position of pillar.
This style of scale was original with us and we have patents covering its most important points of excellence.
Notched beams furnished when so ordered, without extra charge.

BUFFALO COLUMBIAN AUTOMATIC SCALES.

Gold Medal, World's Fair, Chicago, 1893.

Size of platform, 15 inches long, 12 inches wide.
Pillar, 22 inches high.
Total length on counter, 22½ inches.
Total width on counter, 13 inches.

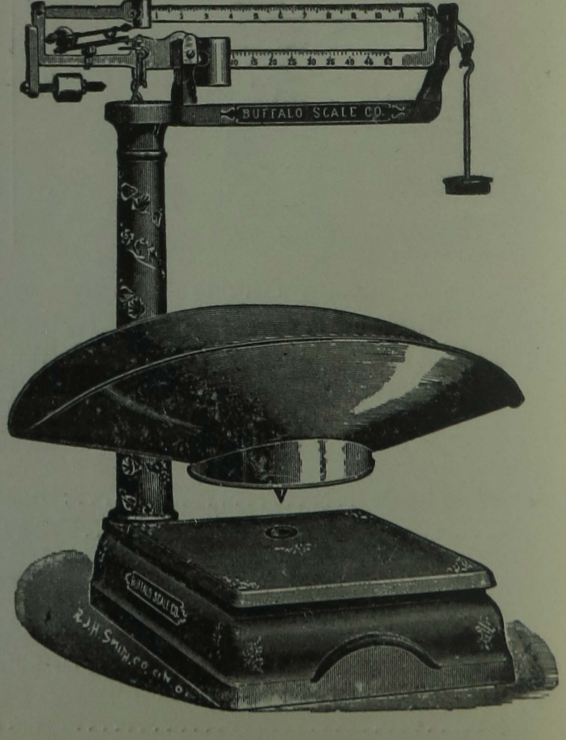
Nickel plated beam and poises.
Double beam, marked on both sides.

Extra finish, ornamented in blue and silver.
Scoop, beam and poises, weights and counterpoise all brass, nickel-plated.

LIST.

New Number.	Capacity. Pounds by Ounces.	Scoop.	Price.
78	250	Large Seamless Brass Scoop.	$32 00

This scale is furnished with patent automatic scoop balance. It is handsomely finished, and perfectly accurate.



BUFFALO UNION SCALES.

LIST.

New Numbers.	Capacity.	Scoop.	Price.
120	½ ounce to 245 pounds	Tin, Seamless	$14 00
121	½ ounce to 245 pounds	Brass, Seamless	15 00

BUFFALO DOUBLE BEAM UNION SCALES.

LIST.

New Numbers.	Capacity.	Scoop.	Price.
123	½ ounce to 245 pounds	Tin, Seamless	$15 00
124	½ ounce to 245 pounds	Brass, Seamless	16 00

BUFFALO DOUBLE BEAM IMPROVED UNION SCALES.

WITH TWO PLATFORMS.

LIST.

New Numbers.	Capacity.	Scoop.	Price.
127	½ ounce to 245 pounds	Tin, Seamless	$15 50
128	½ ounce to 245 pounds	Brass, Seamless	16 50

Tin Funnel Scoop for this Scale ..... $1 00 extra.
Brass Funnel Scoop for this Scale ..... $1 50 extra.
All Scoops Seamless.

BUFFALO REVERSE-ACTING MEAT BEAMS.

LIST.

New Numbers.	Capacity.	Price.
390	1100 pounds	$50 00
392	600 pounds	45 00
393	250 pounds	40 00

Complete, ready to fasten to post. Length of beam (No. 390) 34 inches.
No weights required. Half-pound marks. Brass Beams and poises nickel-plated. Marked on both sides. Other sizes made to order.

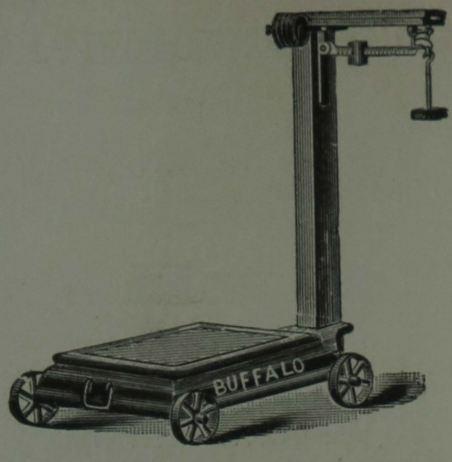
BUFFALO PLATFORM SCALES.

WITH WHEELS AND DROP LEVER.

LIST.

New Numbers.	Old Numbers.	Capacity.	Platform.	Price.
237	1	400 pounds	21 x 15 inches	$ 34 00
238	2	600 pounds	25 x 16 inches	41 00
239	3	800 pounds	25 x 17 inches	46 00
240	4	1000 pounds	26 x 17 inches	51 00
242	5	1200 pounds	28 x 20 inches	59 00
244	6	1600 pounds	29 x 21 inches	70 00
246	7	2000 pounds	32 x 23 inches	82 00
248	8	2500 pounds	33¼ x 24¾ inches	94 00
250	9	3000 pounds	38 x 30 inches	125 00

Our Drop Lever Scales are made very heavy and strong, and have pillar braced.
Notched beam with hanging poise furnished when so ordered.

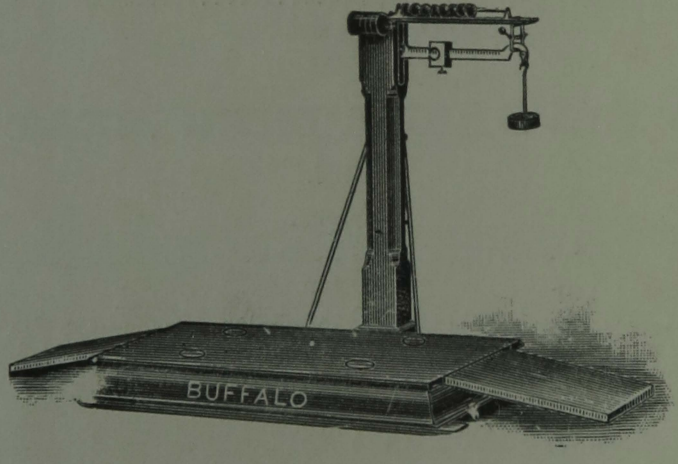


BUFFALO PLATFORM SCALES.

WITH WHEELS.

LIST.

New Numbers.	Old Numbers.	Capacity.	Platform.	Price.
200	1	400 pounds	21 x 15 inches	$26 00
202	2	600 pounds	25 x 16 inches	33 00
204	3	800 pounds	25 x 17 inches	38 00
206	4	1000 pounds	26 x 17 inches	43 00
208	5	1200 pounds	28 x 20 inches	49 00
210	6	1600 pounds	29 x 21 inches	58 00
212	7	2000 pounds	32 x 23 inches	75 00



BUFFALO WHEELBARROW SCALES. (All Iron.)

WITH OR WITHOUT WHEELS.

With Sliding Poise and Iron Pillar Braced.

LIST.

New Numbers.	Capacity.	Platform.	Description.	Price.
341	1000 pounds	2½ x 3½ feet	With Wheels	$75 00
342	1000 pounds	2½ x 3½ feet	Without Wheels	70 00

BUFFALO ICE SCALES.

Same Style as Above Cut, but with Ribs on Platform for Ice to Run On.

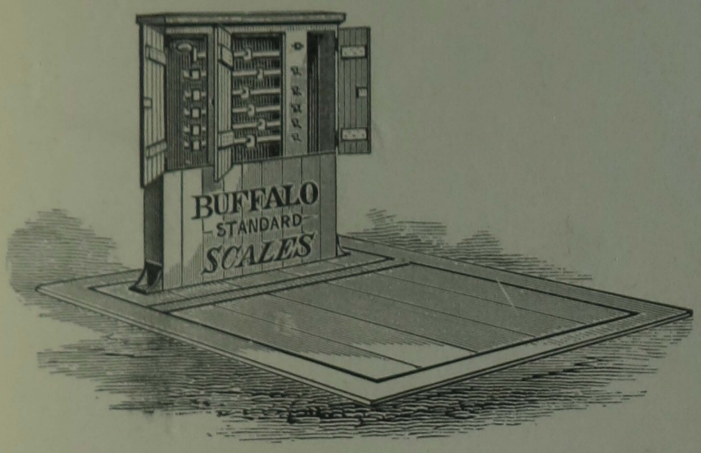
LIST.

New Numbers.	Capacity.	Platform.	Description.	Price.
345	1000 pounds	30 x 42 inches	Without Wheels	$80 00
346	1000 pounds	30 x 42 inches	With Wheels	85 00

Double beam; weight all on beams; no loose weights; brass sliding poises.

BUFFALO FURNACE CHARGING SCALES.

WITH FOUR OR MORE BEAMS.



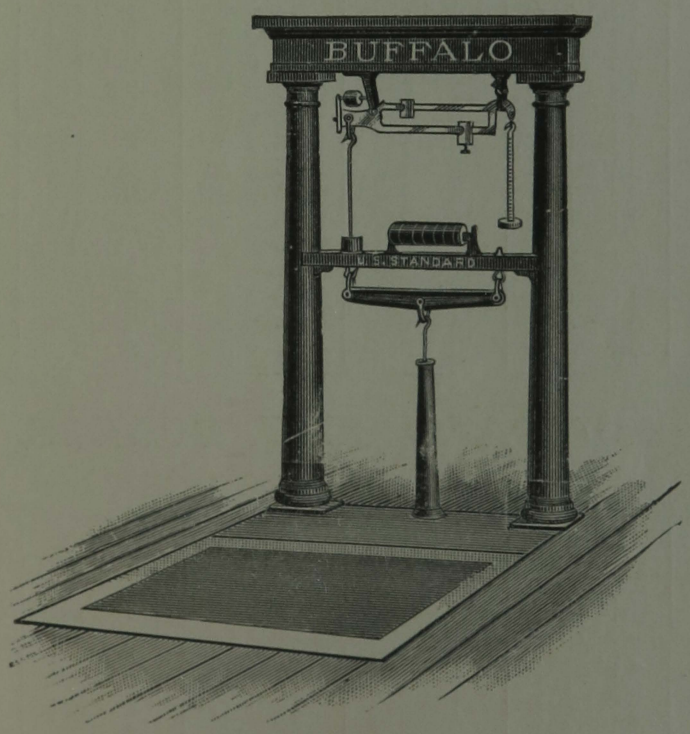
This scale is designed for charging a furnace with a given quantity of four or more different kinds of ore, fluxes, coal or metal. It is so arranged that (by means of indicators outside of the beam box) all the weighing can be done by a person who cannot read, the indicators being first arranged by the foreman. The beam box can be locked up so that the weigher or other employes about the furnace cannot change the weights or know how the furnace is being charged.

The frame and platform of this scale are to be made of hard wood, which is not furnished by us. Frame should be made of 6 x 8 timbers. Instructions for building are sent with each scale. All other parts are furnished by us

LIST.

New Number.	Capacity.	Platform.	Price.
1000	4 tons, 2000 pounds, each beam.	4 x 5 feet.	$230 00

Additional Beams, $10.00 each extra.



BUFFALO TWO PILLAR DORMANT SCALES.

IRON FRAME.

With Two Iron Pillars, Tare Beam and Graduated Counterpoise.

LIST.

New Numbers.	Old Numbers.	Capacity.	Platform.	Price.
434	1	2500 pounds.	36 x 37 inches.	$105 00
436	2	3500 pounds.	42 x 43 inches.	125 00
438	3	5000 pounds.	48 x 50 inches.	170 00
440	"Queen City"	2500 pounds.	37 x 46 inches.	105 00

The pillars of these scales are bronzed, and the finish is elegant in every particular.

BUFFALO HAY SCALES.

LIST.

New Numbers.	All Beams Made of Brass.	Capacity Tons.	Length of Levers. Feet.	Inches.	Length of Connections. Feet.	Inches.	Size of Platform. Feet.	Distance from Inside Edge of Frame to Beam Rod. Feet.	Inches.	Price Exclusive of Timber and Foundat'n Single Beam.	With Patent Combination Beam.
1050	Portable Shallow Pit.	3	10	7½	4		14 x 7	1	8½	$145 00	$165 00
1051		4	12	1½	4	6¾	15 x 8	2	1½	165 00	185 00
1052		5	12	1½	4	6¾	15 x 8	2	1½	200 00	220 00
1053		6	12	1½	4	6¾	15 x 8	2	1½	225 00	255 00
1054		6	14		5	7¾	22 x 8	1	5	250 00	280 00
1055		8	12	5½	4	7¼	16 x 8	2	1½	275 00	305 00
1056		10	12	5½	4	7¼	16 x 8	2	1½	300 00	330 00
1057		12	12	5½	4	7¼	16 x 8	2	1½	320 00	350 00
1058		15	12	5½	4	7¼	16 x 8	2	1½	390 00	420 00
1059		20					16 x 8	Tr. Sc. Pat.		410 00	440 00
1060	Trussed Levers.	8	14	6	5	5	22 x 8	2	2	300 00	330 00
1061		10	13	2	4	6	16 x 8	3		300 00	330 00
1062		15	16	¾	6	½	24 x 9	2	5	400 00	430 00

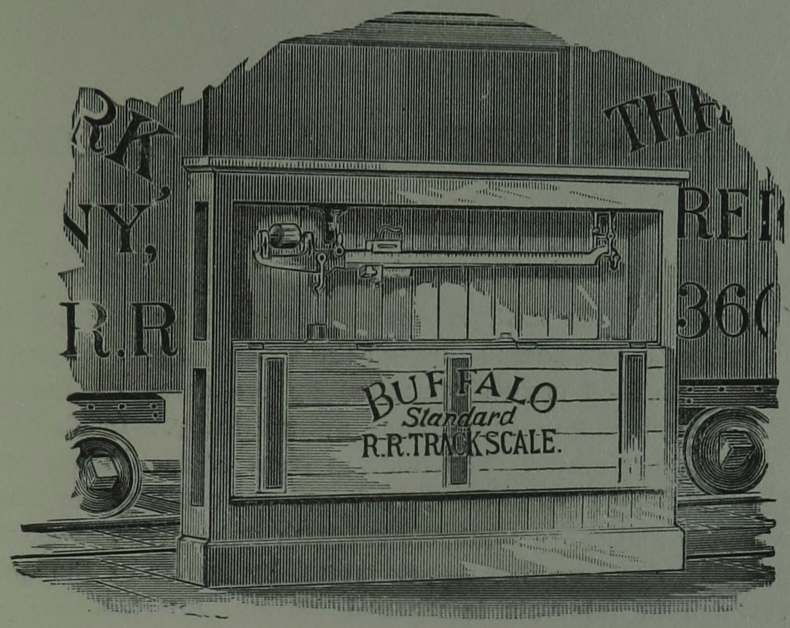
BUFFALO COAL SCALES.

LIST.

New Numbers.	All Beams Made of Brass.	Capacity Tons.	Length of Levers. Feet.	Inches.	Length of Connections. Feet.	Inches.	Size of Platform. Feet.	Distance from Inside Edge of Frame to Beam Rod. Feet.	Inches.	Price Exclusive of Timber and Foundat'n Single Beam.	With Patent Combination Beam.
1072	Portable Shallow Pit.	3	10	7½	4		14 x 7	1	8½	$145 00	$165 00
1074		4	12	1½	4	6¾	15 x 8	2	1½	165 00	185 00
1076		5	12	1½	4	6¾	15 x 8	2	1½	200 00	220 00
1078		6	12	1½	4	6¾	15 x 8	2	1½	225 00	255 00
1080		6	14		5	7¾	22 x 8	1	5	250 00	280 00
1081		8	12	5½	4	7¼	16 x 8	2	1½	275 00	305 00
1082		10	12	5½	4	7¼	16 x 8	2	1½	300 00	330 00
1083		12	12	5½	4	7¼	16 x 8	2	1½	320 00	350 00
1084		15	12	5½	4	7¼	16 x 8	2	1½	390 00	420 00
1085		20					16 x 8	Tr. Sc. Pat.		410 00	440 00
1086	Trussed Levers.	8	14	6	5	5	22 x 8	2	2	300 00	330 00
1088		10	13	2	4	6	16 x 8	3		300 00	330 00
1090		15	16	¾	6	½	24 x 9	2	5	400 00	430 00

Double Beam and Graduated Counterpoise $10.00 more than with Single Beam.

Bronzed Pillars and Cap, $20.00 extra.



BUFFALO RAILROAD TRACK SCALES.

IRON FRAME. SHALLOW PIT.

LIST.

CAPACITY.	LENGTH.	PRICE.
20 tons	16 feet	$ 450 00
25 tons	25 feet	750 00
30 tons	30 feet	875 00
40 tons	30 feet	900 00
40 tons	32 feet	925 00
40 tons	34 feet	1000 00
50 tons	34 feet	1025 00
60 tons	34 feet	1050 00
70 tons	34 feet	1075 00
40 tons	36 feet	1025 00
50 tons	36 feet	1050 00
60 tons	36 feet	1075 00
70 tons	36 feet	1100 00
80 tons	36 feet	1125 00
50 tons	38 feet	1075 00
60 tons	38 feet	1100 00
70 tons	38 feet	1125 00
50 tons	40 feet	1100 00
60 tons	40 feet	1125 00
70 tons	40 feet	1150 00
50 tons	42 feet	1125 00
60 tons	42 feet	1150 00
70 tons	42 feet	1175 00
50 tons	46 feet	1175 00
60 tons	46 feet	1200 00
70 tons	46 feet	1225 00
50 tons	50 feet	1325 00
60 tons	50 feet	1350 00
70 tons	50 feet	1375 00
50 tons	52 feet	1350 00
60 tons	52 feet	1375 00
70 tons	52 feet	1400 00
50 tons	56 feet	1400 00
60 tons	56 feet	1425 00

Double Beam.....$20 00 extra.
Triple Beam..... 35 00 extra.

Exclusive of timber and foundation. Suspension track scales made to order.

MILLING AND TREATING ORES.

GOLD MILLING.

The ore, on entering the mill, is dumped over an inclined grizzley to the rock-breaker floor. The ore is then passed through the rock breaker into ore bins, from which it is drawn through inclined chutes controlled by ore gates, as fast as required, into automatic feeders which supply the stamps automatically. Inside of the mortar are placed one or more copper plates. The table in front of each mortar is covered with a copper plate, size being same width as mortar, and six, eight, ten or twelve feet long, as desired. These copper plates are amalgamated with quicksilver. Free gold is caught on the inside copper plates and outside copper tables, by means of the quicksilver forming gold amalgam, which at intervals is scraped off and retorted, the gold thus gained melted and run into moulds, and the quicksilver saved for use again.

If the pulp from which the free gold has been extracted by amalgamation contains auriferous sulphurets, it is passed over concentrators, and either shipped to the smelters or treated by the chlorination process.

DESCRIPTION OF CHLORINATION PROCESS.

The "concentrates" are dried, then roasted, by which the sulphur, arsenic, antimony and other volatile elements are expelled and the other base metals are oxidized. Salt is added to the charge towards the end of the roasting. This effects a saving of the chlorine in the subsequent chloridizing, and also converts the silver present into chloride of silver. When a dead roast is attained, the roasted ore is drawn from the furnace, wetted down and charged into the vats, where it is impregnated with chlorine. The chlorine is generated by a mixture of peroxide of manganese, salt and sulphuric acid. It is introduced into the vats through false bottoms. The chlorine in the nascent state attacks the gold, forming ter-chloride of gold. This is leached out by water. The lixivium is run into settling vats, where the gold in solution is precipitated by the addition of a solution of sulphate of iron. The precipitated gold is in a finely divided state. It is collected on filters, melted in crucibles with fluxes, and run into ingots.

The chloride of silver (insoluble in water) remaining in the vats is leached out by a solution of hyposulphite of soda (or of lime). The lixivium is run into precipitating vats, where the silver is precipitated as sulphide of silver by the addition of polysulphide of soda (or of lime). The precipitated sulphide of silver is collected, melted and cast into bars.

SILVER MILLING.

Silver milling ores are divided into two classes: *First*—The "free" milling ores, which are amalgamated directly. *Second*—The "base," which require a preliminary or chlorodizing roasting.

WET CRUSHING SILVER MILL.

The ore brought in by cars at the top of the mill is dumped over the inclined grizzley or screen and rolls to the crusher floor. All the small pieces pass through the screen or grizzley into the ore bins beneath. The coarse rock is shoveled into the crusher from the floor, which is on a level with its receiving jaws, and is crushed to the size of

walnuts, falling into the ore bins, from whence it passes into the automatic feeders through inclined chutes controlled by ore gates. The automatic feeders, being kept full, supply the crushing machinery uniformly and as fast as required.

From fine crushing machinery, the ore is elevated to the sizer or screens. The material which is fine enough flows into large settling tanks, where excess of water is drawn off, or, if the "Boss system" is used, flows directly into the pans. The thick pulp remaining is shoveled in regular charges into a row of amalgamating pans, in which it is worked several hours, first with salt, blue stone and other chemicals, then with additions of quicksilver.

The contents of the pans are run into large settlers placed below and in front of the pans, in which the pulp is thinned by additions of water and gentle agitation, and all the quicksilver with precious metals in the form of amalgam settled to the bottom. The pulp is gradually run off from the settlers and flows to waste. The amalgam is strained from the excess of quicksilver, retorted to drive off the remaining quicksilver, and the resulting mass of silver and gold melted into bars.

Sometimes values carried in bases which will not yield to the above process are caught by concentrators, which receive the waste pulp from the settlers.

A clean-up pan is generally furnished with a ten-stamp mill and larger mills.

All of the best silver mills are now provided with a quicksilver system for elevating and distributing quicksilver throughout the mill automatically, and this is accomplished by a special elevator.

DRY CRUSHING SILVER MILL.

Where ore is base and needs roasting, and desulphurizing before amalgamation can be successful, a modification of the wet crushing mill is necessary. After passing the rock breaker, the ore is dried by passing through a continuously revolving dryer, or a shelf dry kiln. The dried ore is then taken by a car (or run in chutes lined with sheet iron and regulated by gates when height will admit) to the automatic feeders, which feed the granulators or stamps. The pulverized product from the granulators or stamps is raised by an elevator to iron storage bins and charged into a roasting furnace in the furnace room. The roasting furnace may be a Bruckner, Howell-White Reverberatory Furnace or O'Hara Furnace. In the furnace the ore, with the addition of common salt, is desulphurized and chlorodized, thus preparing it for the pans and settlers. After roasting, the ore is spread on a cooling floor, and is taken as required to the pans.

Amalgamation follows on the same plan as in the wet mill described above.

LEACHING OR LIXIVIATION OF SILVER ORES.

In a leaching mill, the treatment of the ore up to the end of the roasting process is the same as in the amalgamating mills, as also is the arrangement of the breaker, drying floor, feeders, stamps, conveyors, elevators and roasting furnace.

From the furnace, the chlorodized ore is put in charges into large vats, where the ore is exposed to the solvent action of certain chemical solutions, usually strong brine or hyposulphate of soda. These liquors dissolve the chloride of silver, and pass through a filter bottom of the vats into precipitating tanks below, where the silver is thrown down from its solution by certain re-agents, commonly sulphide of lime. The depleted liquor is pumped back to a large storage tank at top of leaching room for further use. The precipitated silver is dried and melted into bars.

We are prepared to furnish vats of various forms and all kinds of tanks and tubs, and of clear white pine, red wood, white wood or other materials as preferred.

CYANIDE PROCESS.

In a cyanide mill, the ore is crushed to the desired fineness, either wet or dry, as desired. It is then charged into large steel tanks, and the gold and silver leached out by a very weak solution of cyanide of potassium. The liquor is drawn from the tanks and passed through precipitating boxes containing metallic zinc in the form of fine threads or shavings. Here the gold and silver is precipitated, and the liquor pumped back to the solution tanks, where it is brought back to standard strength.

We are prepared to furnish the complete machinery for cyanide mills, crushing and sizing machinery, solution, leaching and vacuum tanks, precipitating boxes, pumps, etc.

CONCENTRATING MILL.

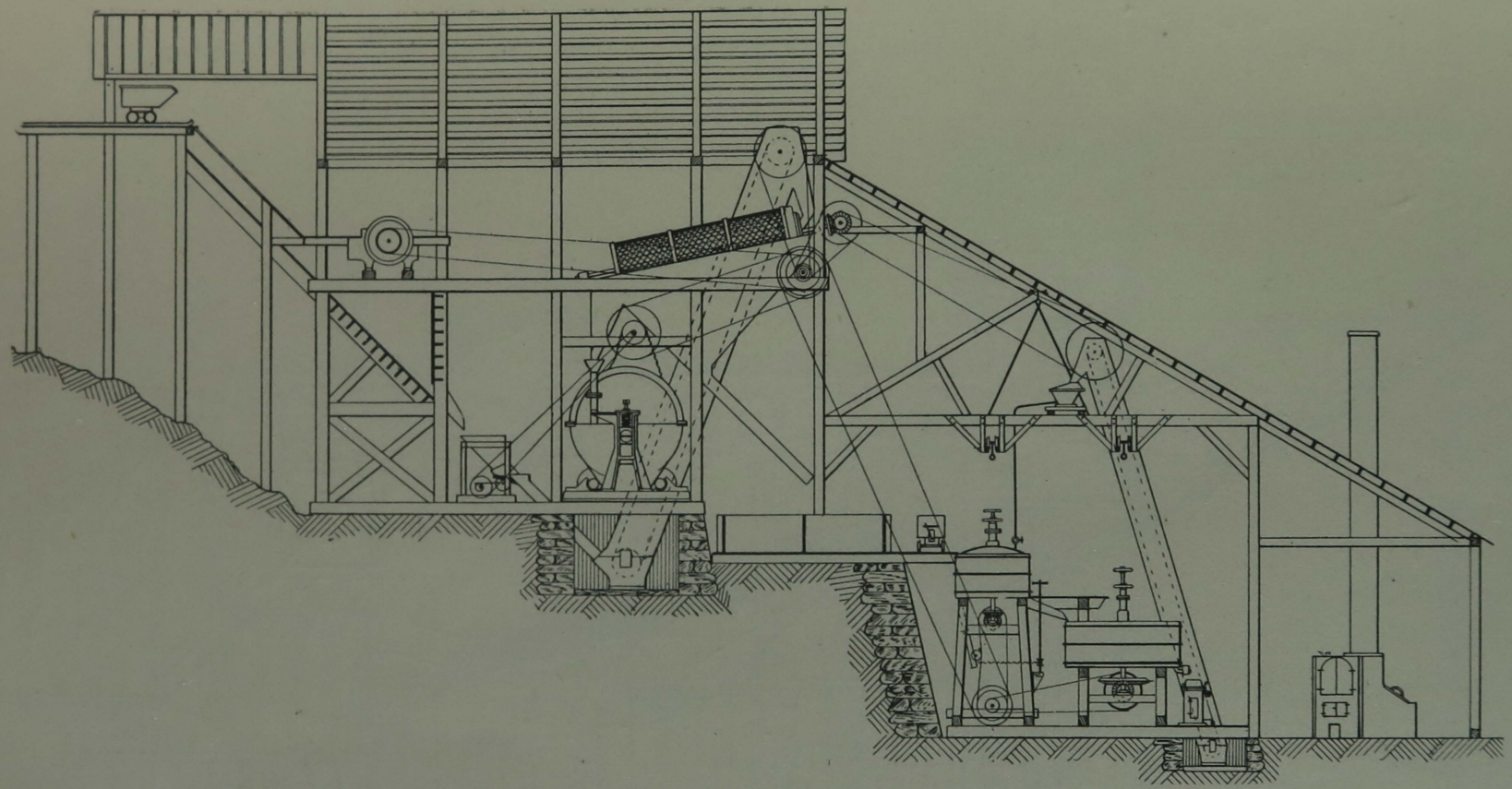
Concentration is a preliminary manipulation by which ores are prepared for subsequent metallurgical treatment. It may be divided into: *First*—Concentration Proper; and, *second*, Ore Dressing.

Concentration Proper—This has for its object the reduction in bulk of the material to be treated by subsequent processes. The reduction in bulk consists in the elimination of the worthless gangue and the consequent concentration of the valuable mineralogical contents of the ore. Thus a hundred tons of ore carrying ten per cent. of galena would yield ten tons of galena as the product of concentration. By this means the smelting of ninety tons of gangue would be obviated. In practice, of course, there would be some loss of galena incident to the concentration, while some gangue would be contained in the concentrates.

Ore Dressing—Ore dressing has for its object, in addition to the concentration of the mineral constituents of an ore, the elimination of certain minerals that would be detrimental to the subsequent treatment of the "concentrates." For example, many argentiferous galena ores carrying zinc blende, which is usually poor in silver, and which not only causes an increased consumption of fuel, but also gives rise to excessive silver losses in the subsequent smelting process. By dressing is likewise effected the separation into distinct products of the several metallurgical ingredients of an ore. The desirability of treating ore by concentration and dressing for the extraction of metals by other processes is purely an economic question, depending upon the costs of concentration and dressing as compared with the saving thereby effected in its final treatment.

The ore, after passing through the crusher, falls into the ore bins, and is drawn out as required into the automatic feeders which regulate the supply to the granulators. The feeder delivers the ore to an elevator, which raises it to the head screen. The oversize returns to the granulator for crushing. What passes through the first screen is delivered into screen No. 2, and so on. The particles of ore remaining on the screens are discharged into the jigs below. The jigs separate the heavy mineral particles from the light waste particles of rock. The screening is usually done wet, with jets of water washing the screens to keep them clear.

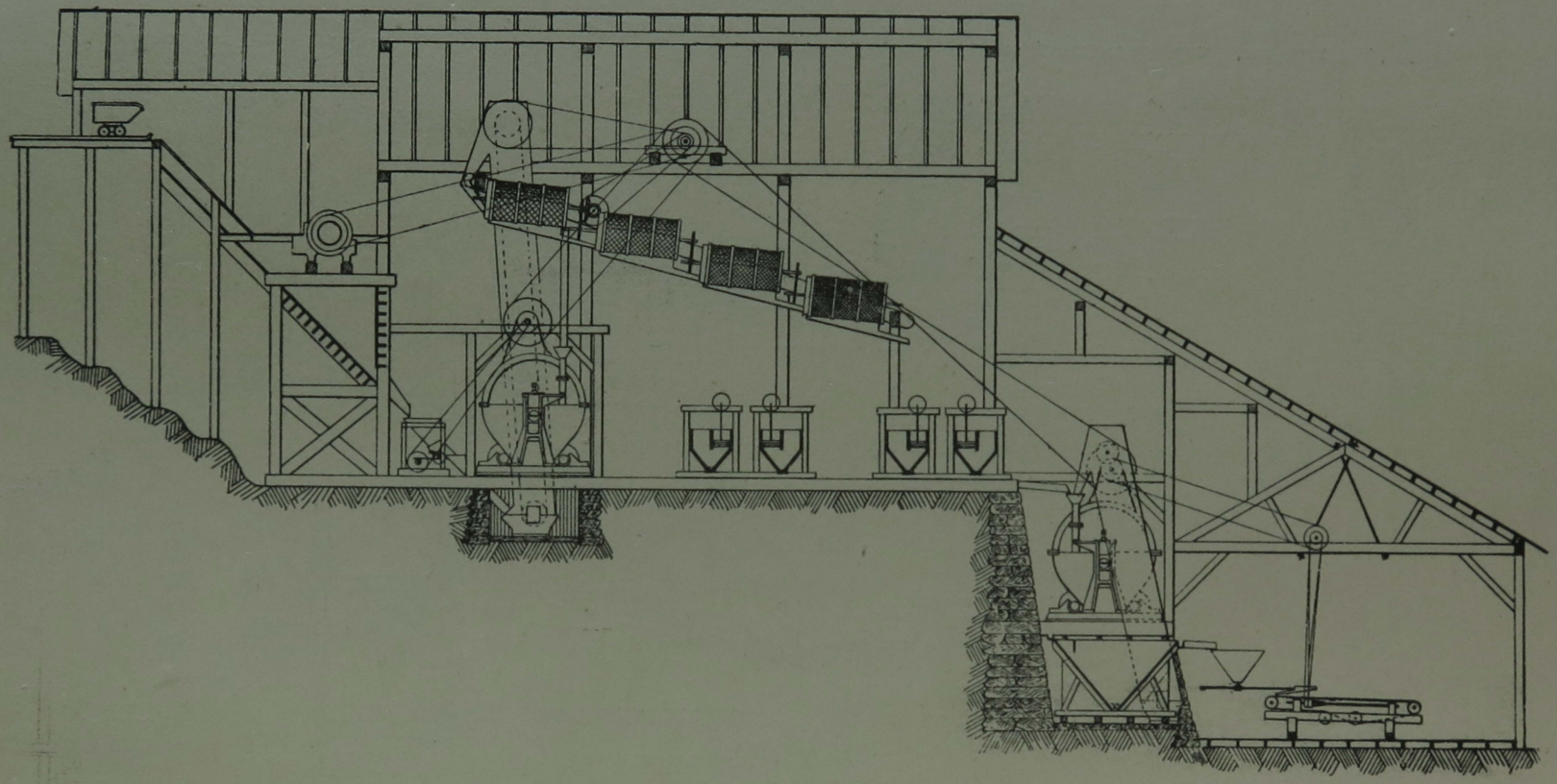
The material too fine to be caught on the last of the revolving screens is run over hydraulic classifiers and delivered to the slime dressing machinery. The tailings from the jigs are re-crushed and also go to the classifiers for treatment on the tables. For some ores this is found necessary, small particles of mineral being carried by pieces of rock several times the volume of the mineral in size, but so small and light that they have been carried past the previous saving devices.



Grizzley. Rock Breakers. Ore Feeder. Crusher and Elevator. Screens. Tanks. Almalgamator. Settler. Amalgam Safe. Engine and Boiler.

SILVER MILL FOR FREE MILLING ORES.

We merely give an outline of mill arrangements, not intended to show any especial machines.



Grizzley. Rock Breaker. Ore Feeder. Crusher and Elevator. Screens. Jigs. Jigs. Crusher. Concentrator.

CONCENTRATING MILL.

We merely give an outline of mill arrangements, not intended to show any especial machines.

WE MANUFACTURE

METALLURGICAL AND MINING MACHINERY

AS FOLLOWS:

AMALGAMATING MACHINERY.

Stamp Mills for wet or dry crushing, Davis Granulators, Amalgamating Pans, Settlers, Agitators, Clean Up Pans, Concentrators, Retorts, Amalgam Safes, Bullion Moulds, Conveyors and Elevators, Roasting Furnaces, Dryers, Melting Furnaces, Copper Plates, plain and silver-plated, Bruckner Roasting Cylinders.

ROASTING AND CHLORIDIZING MACHINERY.

Reverberatory Furnaces, Bruckner Roasting Furnace, Howell & White Revolving Furnaces, and Shelf Ore Dryers.

CRUSHING MACHINERY.

Stamp Mills, Blake Crushers, Dodge Crushers, Cornish Rolls, Davis Granulators, Sample Grinders, Grizzleys, Improved Challenge Ore Feeders.

CONCENTRATING MACHINERY.

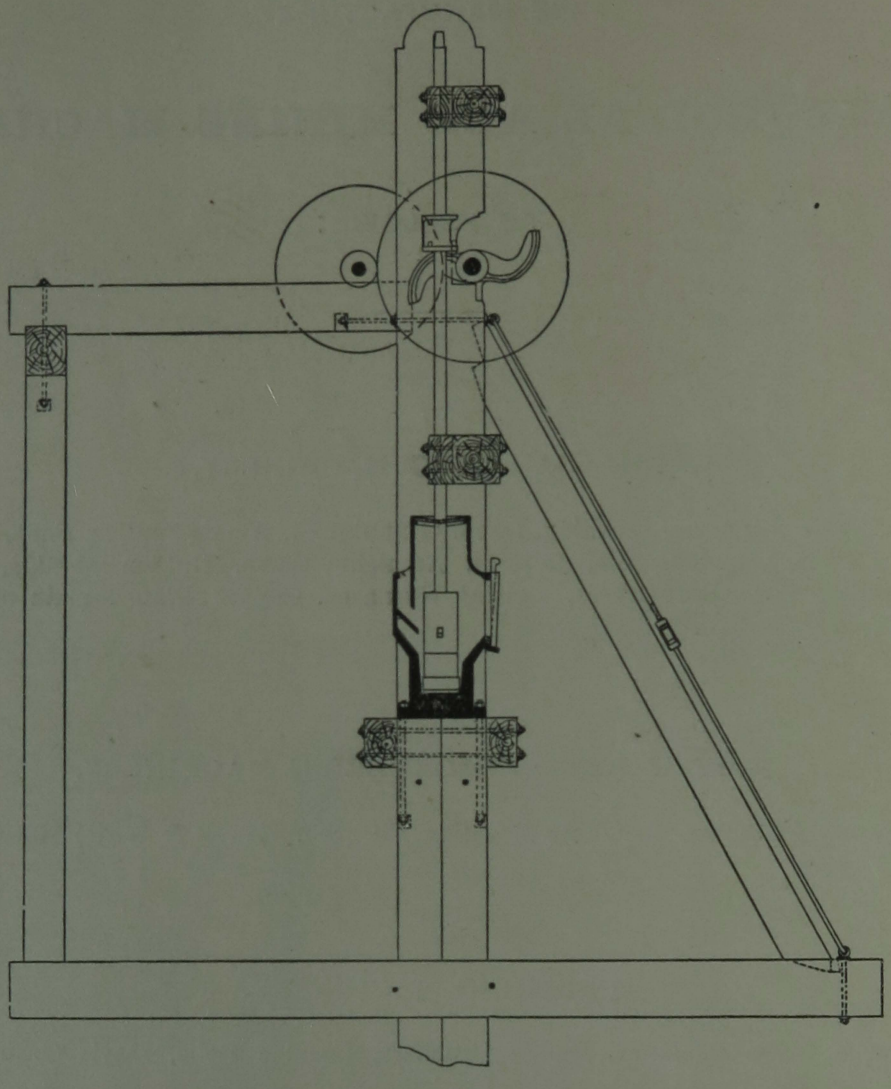
Jigs, Buddles, Colorado Bumping Tables, Cranmer Concentrators, Frue Vanners and Embry Concentrating Tables, Trommels with punched metal or wire screens.

SMELTING MACHINERY.

Water Jacketed Blast Furnaces for Lead or Copper Ores, with wrought or cast iron jackets; Slag Pots and Cars, Bullion Moulds and Cars, Lead Ladles, Refining Furnaces, Reverberatory Furnaces, Matte Furnaces, Furnaces for Pyratic Smelting.

The best known processes for the treatment of ores in Western America.

Free Gold Milling, together with Concentration and Chlorination; Free Silver Milling, Roasting Silver Milling, Concentration, Lixiviation, Cyanide Process.



THE GILPIN COUNTY STAMP MILLS.

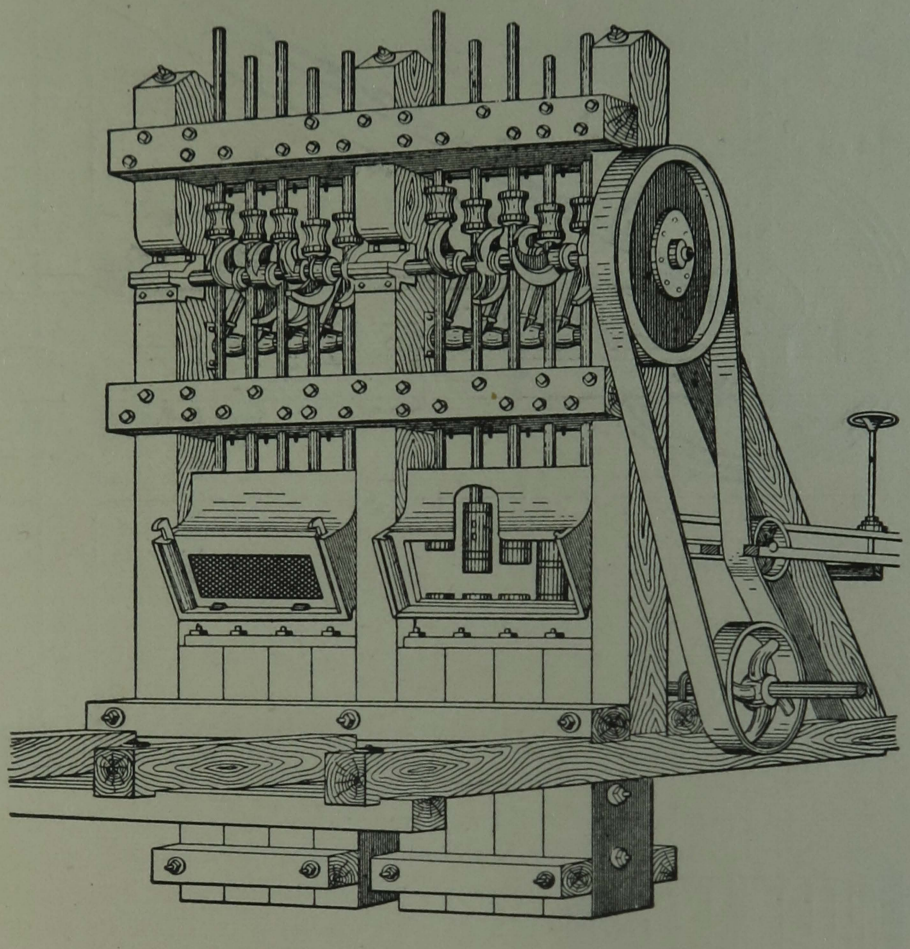
This cut shows a cross-section of a high mortar, single issue, geared mill, of the style known as the Gilpin County Mill.

This mill is adapted for working free milling gold ores, the amalgamating being done on copper plates inside and outside the mortar.

The distinctive features of this style of mill are the slow speed, high drop and medium weight of the stamps. The stamps vary from 7½ to 8 inches diameter, and from 450 to 650 pounds per stamp. The speed is from 30 to 40 drops per minute, depending on the class of ore treated. Height of drop, about 16 inches.

For silver ores and those gold ores where amalgamation is not practicable on copper plates, wet crushing and concentration, or dry crushing, roasting and chlorodizing and pan amalgamation are resorted to.

For these processes the style known as the California Mill is used. In this mill it is desirable to crush as much material as possible, and force it through the screens at once.



THE CALIFORNIA STAMP MILLS.

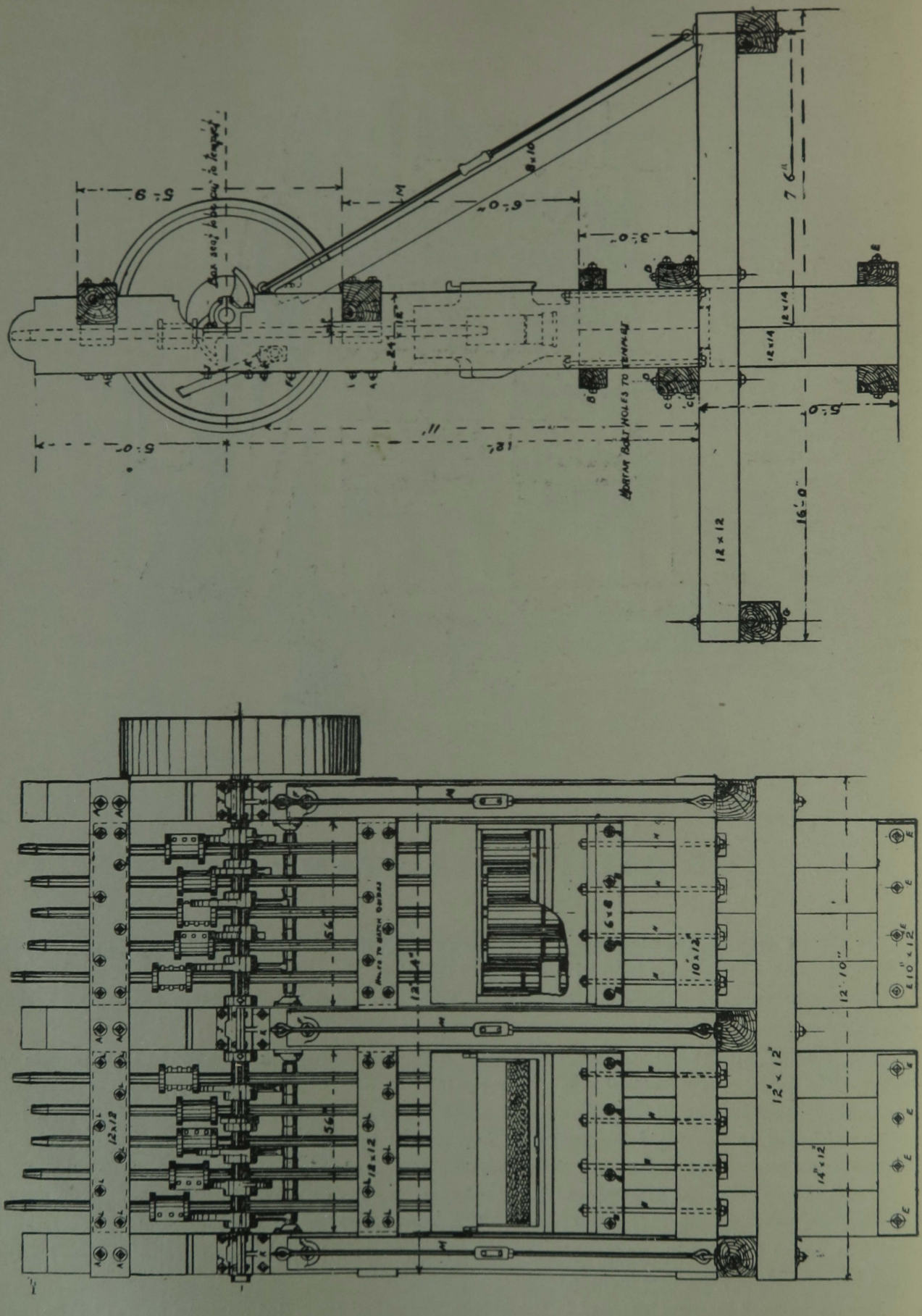
To accomplish this, the stamps are run at high speed with a low drop and heavy stamps, and the screens are placed about on a level with the top of the dies.

The mortars are generally of the double issue type, with straight or inclined screens for wet or dry crushing.

The stamps are from 8 inches to 10 inches diameter, and weigh from 650 to 1,000 pounds per stamp. The speed ranges from 60 to 110 drops per minute, and drop from 4 to 8 inches.

In these mills the cam shaft is driven by a wood pulley on same. This is necessary, as an iron pulley subjected to the rapid succession of jars caused by the dropping of the stamps would soon crystalize and break. The guides for the stamp stems are made of pieces of oak, maple or other hard wood, and in two parts, bored at proper distances apart for the stamp stems, and being set with keys between, can be closed together as they wear. Wooden cam shaft pulleys and guides for stems are always included in our bids, unless otherwise specified, and all bolts, rods, nuts and washers for the entire battery frame work also included.

The frame work is never included in our bids unless called for. But we make many of them, and when the district to which the mill is going is without good timber, it sometimes is found advisable to order battery frames of us.



PLAN OF STAMP MILLS.

GENERAL SPECIFICATION OF A TEN STAMP BATTERY.

2 High Cast Iron Mortars, of latest improved pattern, single (or double) discharge, planed on bottom, drilled by template and seats for screen frames planed.
2 Screens of hard wood, fitted to mortars.
4 Wrought Iron Keys for same.
2 Screens of Russia iron or wire cloth.
2 Sheets of rubber for mortar foundations, ¼ inch thick.
10 Stamp Dies.
10 Stamp Shoes.
10 Stamp Heads or Bosses, bored for stems.
10 Stamp Stems of refined iron, both ends tapered and fitted to heads.
10 Stamp Tappets, fitted with wrought iron gib and two steel keys in each.
10 Cams, right and left hand, double lift hubs fitted to shaft, with steel keys marked to place.
1 Cam Shaft of hammered wrought iron, turned full length, key seated and marked where cams are fitted.
3 Cam Shaft Boxes, babbited and planed on bottom and back.
2 Cam Shaft Collars, with steel set screws.
1 Cam Shaft Pulley, built up complete on double cast iron sleeve flanges; to be thoroughly built and turned true, flanges keyed to cam shaft.
1 Set Upper Hard Wood Guides for stems, bored for stems and bolts.
1 Set Lower Hard Wood Guides for stems, bored for stems and bolts.
2 Jack Shafts of wrought iron.
4 Side Boxes or Brackets for jack shafts.
10 Cast Iron Sockets for levers.
10 Hard Wood Levers for same, for stamp holders.
All bolts, rods, nuts and washers for the entire framework of battery according to our plans.
1 Set of Water Pipes, Valves and Fittings for stamps proper when mill is wet crushing.

We furnish complete working drawings for setting all our machinery and plans for frames also, so that any competent millwright can build the frames and set the machinery.

STAMP BATTERIES.

LIST.

Complete in detail as per specifications above. Weight of iron work, including wood pulley and guides.

5 Stamps, 450 pounds each..... 9500 pounds.	5 Stamps, 750 pounds each.....12500 pounds.
10 Stamps, 450 pounds each.....18000 pounds.	10 Stamps, 750 pounds each.....24500 pounds.
5 Stamps, 550 pounds each.....10000 pounds.	5 Stamps, 850 pounds each.....15000 pounds.
10 Stamps, 550 pounds each..... 19500 pounds.	10 Stamps, 850 pounds each.....29500 pounds.
5 Stamps, 650 pounds each.....11000 pounds.	5 Stamps, 950 pounds each.....17000 pounds.
10 Stamps, 650 pounds each.....21500 pounds.	10 Stamps, 950 pounds each.....33000 pounds.

BATTERY FRAMES.

LIST.

1 Complete Frame for 5 Stamps of from 550 to 650 pounds; weight..... 9600 pounds.
1 Complete Frame for 5 Stamps of from 750 to 850 pounds; weight..... .....12000 pounds.
1 Complete Frame for 10 Stamps of from 550 to 650 pounds; weight..... .....17000 pounds.
1 Complete Frame for 10 Stamps of from 750 to 850 pounds; weight.....20000 pounds.

PRICES ON APPLICATION.

REPAIRS FOR STAMP MILLS.

Made of white iron, cast, chrome, manganese, blistered or hammered steel, as desired.

We have a complete line of patterns for stamp mills, and are prepared to furnish repairs at short notice.

Various portions of a stamp mill subject to wear require renewing from time to time, and we give diagrams for these castings, showing how parties may order them with the certainty of their fitting.

We make a specialty of furnishing hard iron shoes and dies. They are cast from a special mixture of irons and will wear very even; their wearing qualities cannot be equaled by any other hard iron castings made.

Our tappets are fitted with steel gibs and keys. When white iron is used the faces are chilled; when steel is used the faces are turned.

The stamp heads are plain, as shown in the cut, but we also make them with wrought iron bands shrunk on if specially ordered.

Our cams have broad, smooth-wearing surfaces cast on chill and ground. The arms are flush on one side and have a hub on the other. For the heavier stamps a wrought iron band is shrunk on the hub.

We make the cams right and left and of any drop desired. We also furnish sectional cams to replace broken ones without taking down cam shaft.

In ordering castings merely give each dimension with the corresponding letters, for example: .....Shoes, J to H.....inches. K to L.....inches. A to B.....inches. O to P.....inches. M to N.....inches.

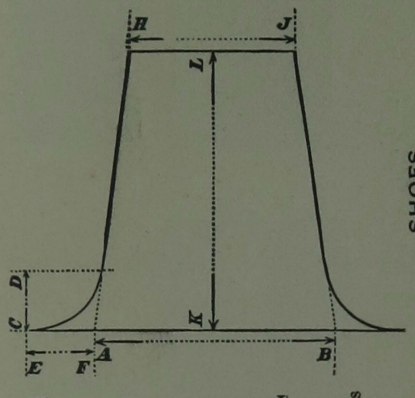
Below is a list of the approximate weights of different portions of a stamp mill for various weights of stamps. The weights vary considerably in different makes of mills.

LIST.

Weight of Stamp, pounds....	500	550	600	650	700	750	850
Weight of Cam, pounds.....	100	120	120	130	130	145	150
Weight of Tappet, pounds....	75	75	75	75	95	95	95
Weight of Head, pounds.....	140	155	160	190	215	250	295
Weight of Shoe, pounds.....	115	115	130	145	150	150	150
Weight of Die, pounds.....	70	70	75	75	75	75	80
Weight of Stem, pounds.....	170	205	245	240	245	255	300

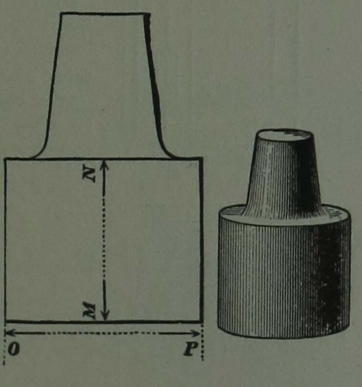
Dimensions of Castings for Stamp Mills.

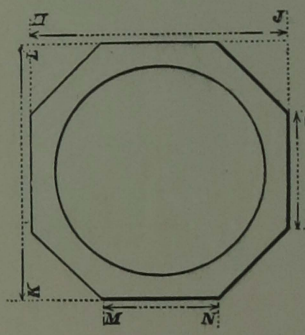
White Iron, Cast, Chrome, Blistered or Hammered Steel to order.



SHOES.

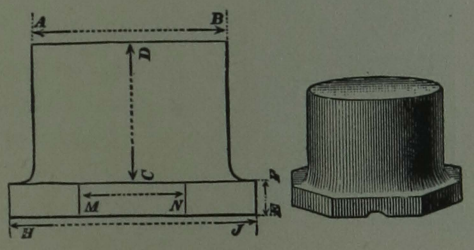
Diameter at Base of Shank (if Shoulder Corners are Sharp) from *A* to *B*..... inches
Dimensions of Fillet at Base of Shank, if Round Corners are desired, *C* to *D*.. do
And from *E* to *F*..... do
Diameter of Apex of Shank *H* to *J*..... do
Height, Shank from *K* to *L*..... do
Height, Shoe from *M* to *N*..... do
Diameter, Shoe from *O* to *P*..... do

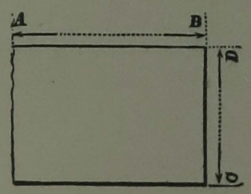




SOLID FLANGE DIES.

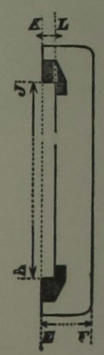
Diameter from *A* to *B*..... inches
Height from *C* to *D*..... do
Thickness of Flange *E* to *F*..... do
Breadth of Flange from *H* to *J*... do
Length of Flange from *K* to *L*.. do
Distance from *M* to *N*..... do
" *O* to *P*..... do





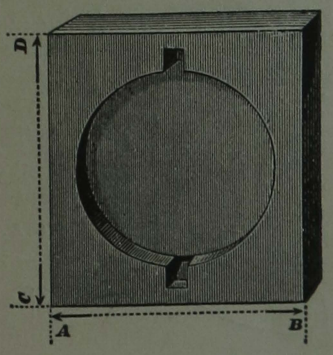
PLUG DIES.

Diameter from *A* to *B*.....inches
Height from *C* to *D*..... do

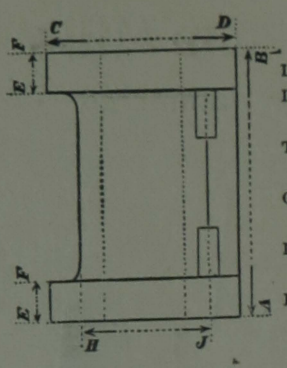


FLANGES FOR PLUG DIES.

Width from *A* to *B*.....inches
Length from *C* to *D*..... do
Thickness from *E* to *F*..... do
Diameter of Recess from *H* to *J*..... do
Depth of Recess from *K* to *L*..... do

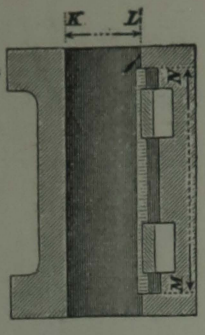


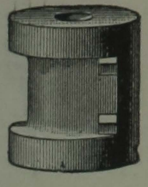
Parties ordering are requested to fill out ALL of the above Measurement Spaces.

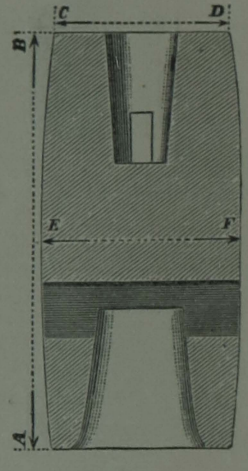


Tappets.

Length from *A* to *B*.....inches
Diameter of Flange from *C* to *D*..... "
Thickness of Flange from *E* to *F*..... "
Outer Diameter of Cylinder from *H* to *J*..... "
Inner Diameter of Cylinder when Bored from *K* to *L* "
Length of Gib Bed from *M* to *N*..... "

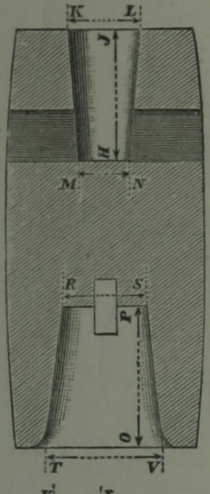


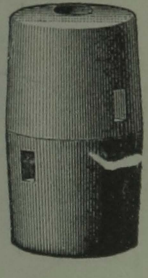


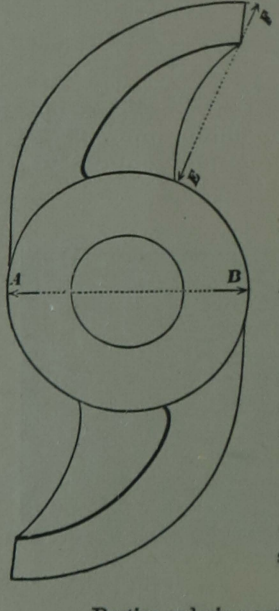


Bosses, or Heads.

Length from *A* to *B*..... ... inches
Diameter from *C* to *D*..... "
Diameter from *E* to *F*..... "
Depth of Stem Socket, *H* to *J*..... "
Diameter " " *K* to *L*..... "
" " " *M* to *N*..... "
Depth of Shank " *O* to *P*..... "
Diameter " " *R* to *S*..... "
" " " *T* to *V*..... "





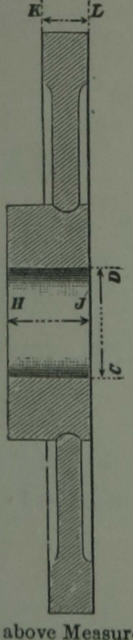


Cams.

RIGHT OR LEFT HAND, DOUBLE OR SINGLE ARMS, AS ORDERED

Diameter of Hub from *A* to *B*.....inches
Diameter of Bore for Cam Shaft (when Bored) from *C* to *D*..... "
Lift from *E* to *F*..... "
Depth of Hub from *H* to *J*..... "
Thickness of Arms from *K* to *L*..... "

Distance from center of Cam shaft to center of stamp stem.



Parties ordering are requested to fill out ALL of the above Measurement Spaces.

DIRECTIONS FOR DESIGNATING AND ORDERING CAMS.

Looking from the feed side of the battery, the cam shaft will revolve from you—over, like the hands of a watch. All "right-hand" cams will then appear with their hubs on the right side of the cam, and all "left-hand" cams with their hubs on the left side of the cam.

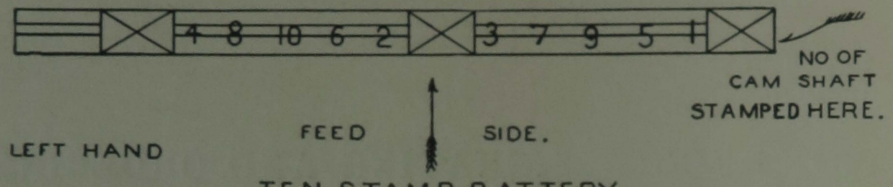
The keys-ways of the cams are cut so as to fix them in different angular positions, and give an order of drop for the stamp, by which the pulp is driven to and fro in the mortars, so that the stamps will do their best crushing duty upon it, and is given a good "swash," so as to clear the screens and afford the best discharge.

A proper order of drop is also favorable to the uniform wear of shoes and dies, equalizing their duty; and to the endurance of the mortars, and their foundations, balancing the force of the blows upon them.

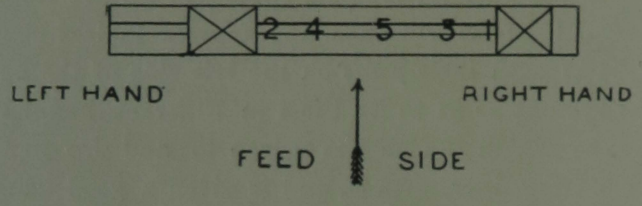
These objects are sought by various ways of arranging the cams on their shafts. When not otherwise instructed, our method, which is well approved, will be as shown in the following diagram.

Our standard order of drop, which determines the key-seating, is shown by the numbers *on* the shaft in the diagram. These start always at the right end of the cam shaft, when it is viewed from the feed side of the battery. These numbers are not stamped upon the machinery, but for convenience of erection, numbers are stamped upon the cams, the cam keys, and the cam shaft in the key slot at the place where the cam belongs. These erection numbers begin at the pulley end whether it is right or left and run consecutively 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

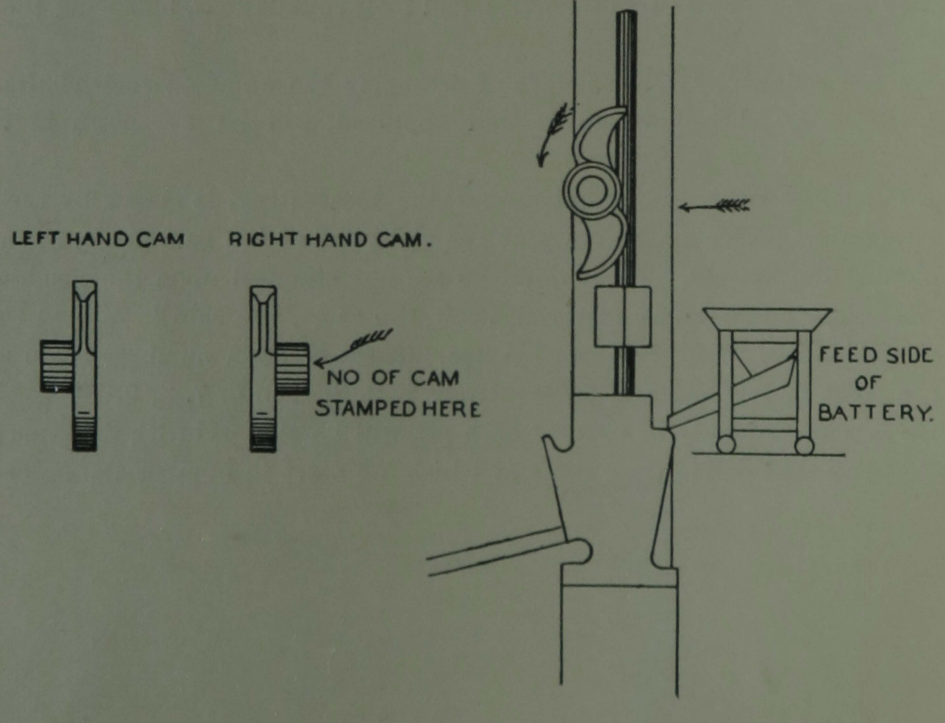
When *several* sets are ordered, the cams of each set will be stamped with the same letter, which will also be stamped on that end of their shaft at which we start to number the order of the drop.

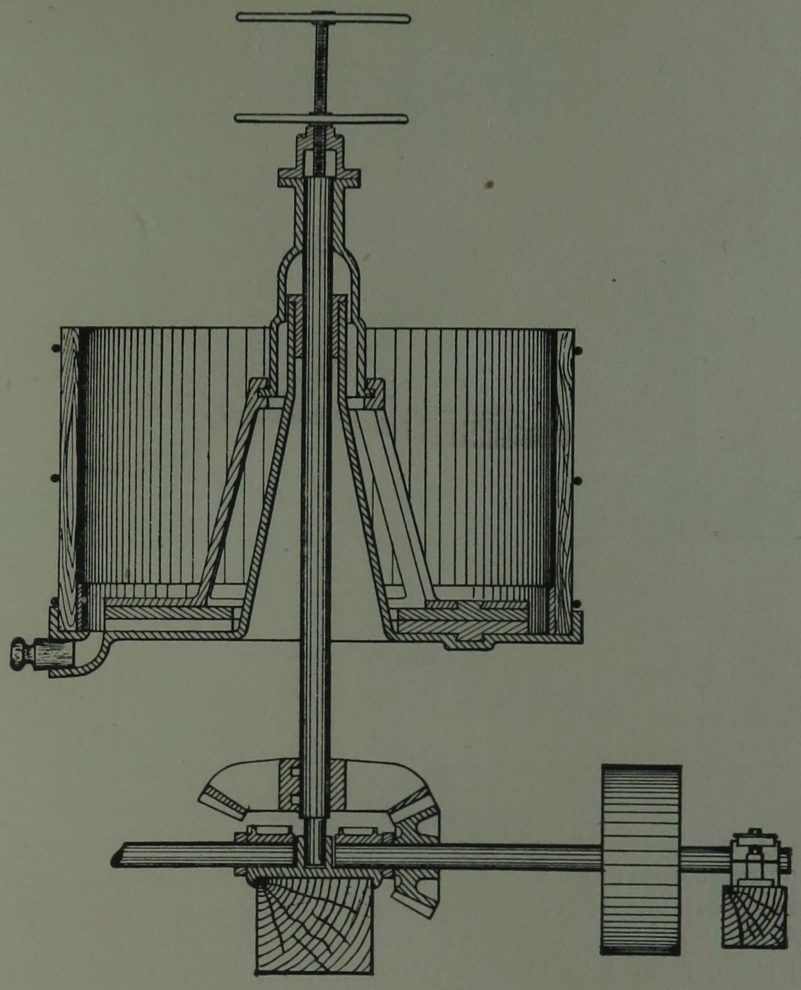


TEN STAMP BATTERY.



FIVE STAMP BATTERY.





AMALGAMATING PANS.

The cut on this page represents our 5-foot Combination Pan, so called from its being a combination of the best features of other well-known pans heretofore made. The sides are made of wood or boiler iron, as desired. We can confidently recommend this pan as equal to any, either for grinding or amalgamating. We furnish it complete with 30-inch driving pulley (for 10-inch belt), with tighteners, pawls, hand shaft, etc. With or without steam bottom. Capacity, one ton of ore to a charge.

FOUR-FOOT PAN.

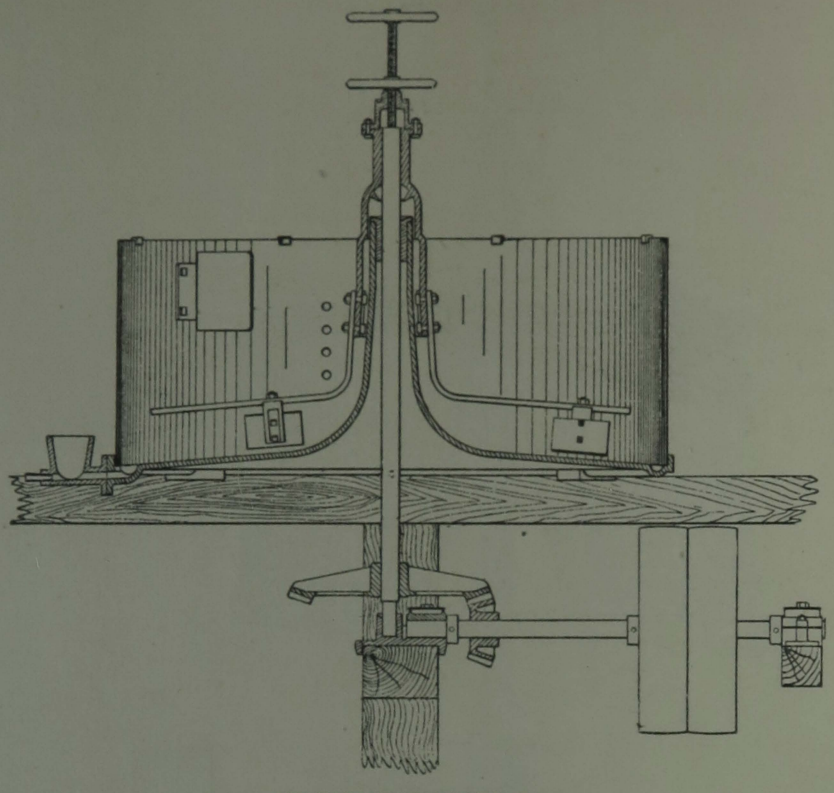
This pan has iron sides, cast in one piece with the bottom, and weighs complete with shoes and dies, steam bottom, pulleys, etc., 2,400 pounds.

FOUR-FOOT CLEAN-UP PAN.

This pan, like the preceding, has iron sides 18 inches deep, cast in one piece with the bottom, and weighs complete with arms and shoes, pulleys, etc., etc., 1,300 pounds.

TWENTY-INCH PROSPECTING PAN.

A pan of this size has been found to be very useful for prospecting purposes, for sampling and the laboratory. The sides are iron, 10 inches deep, and weighs complete with shoes, dies, steam bottom, pulleys, etc., 380 pounds.

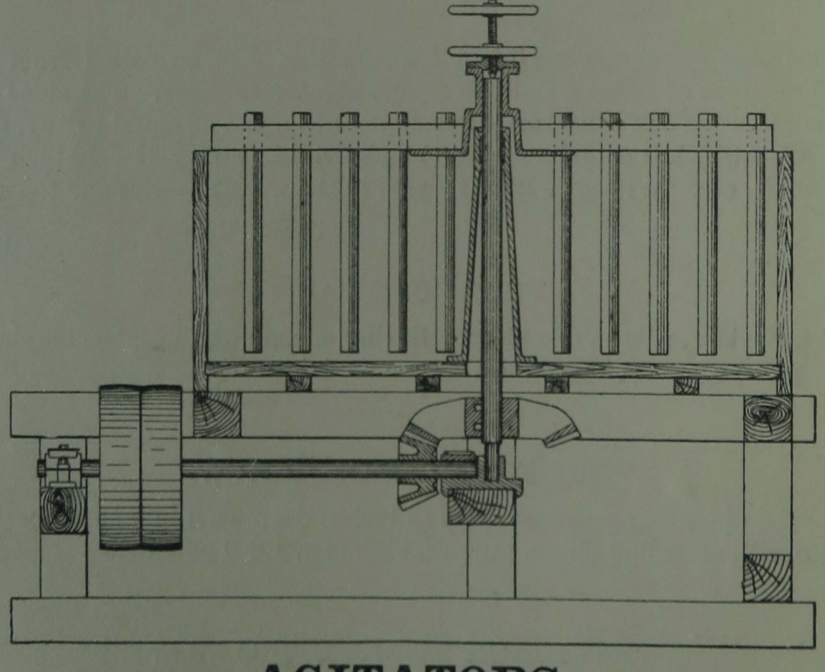


SETTLERS.

The above cut represents our 8-foot Settler. We make the sides of wood or iron, as desired, and with flat or conical bottom. It is furnished complete with fast and loose pulleys, 36-inch diameter for 8-inch belt. Amalgam bowl, overflow spouts, hoops, etc., etc.

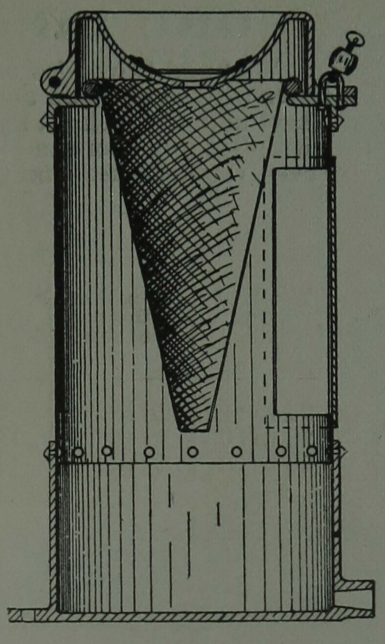
We make all sizes, from 4 to 10 feet in diameter, but 8 feet is the standard size, and the one mostly preferred by mill men.

We have a full assortment of patterns for amalgam safes, silver and gold retorts, smelting furnace castings, bullion moulds, etc.



AGITATORS.

An auxiliary settler, placed below and saving any fine particles of amalgam or mercury which may escape from the settler.



AMALGAM SAFES.

The cut represents one form of Amalgam Safe which is in common use. The body is of sheet iron, containing a locked door, through which to reach the strainer or canvas bag. The top and bottom are of cast iron. A hinged cover is attached to the top and secured by a padlock as shown. The safe is placed below the syphon discharge of the settler, and receives the amalgam and quicksilver from the settler through the opening in the cover, the canvas bag or strainer serving to filter the quicksilver retaining amalgam in a stiff, pasty condition, and the excess of quicksilver is drawn off from the bottom in pipes leading to the quicksilver elevator, by which it is returned to the upper part of the mill ready for re-distribution.

AMALGAM CARS.

Amalgam Cars are used to carry the amalgam gathered from the pans and settlers to the retort rooms in large silver mills. The bodies are of sheet iron and covers are hinged and provided with locks.

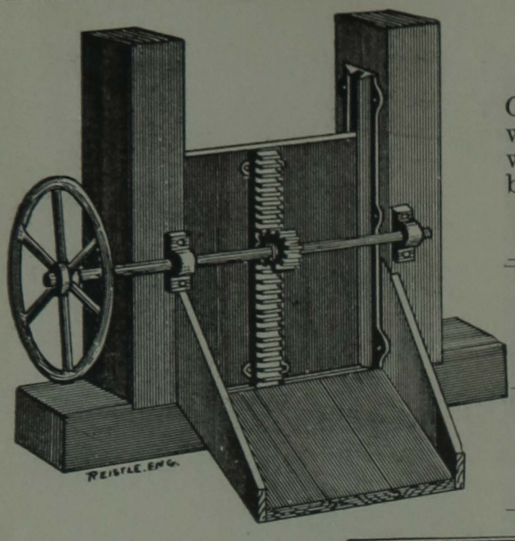
MERCURY ELEVATORS.

Mercury Elevators are much the same as ordinary ore elevators, but are entirely cased in iron, with iron cups and chain belt.

ACID PUMPS.

Acid Pumps of hard rubber, copper, stoneware, wood, etc., to suit conditions.

PRICES ON APPLICATION.

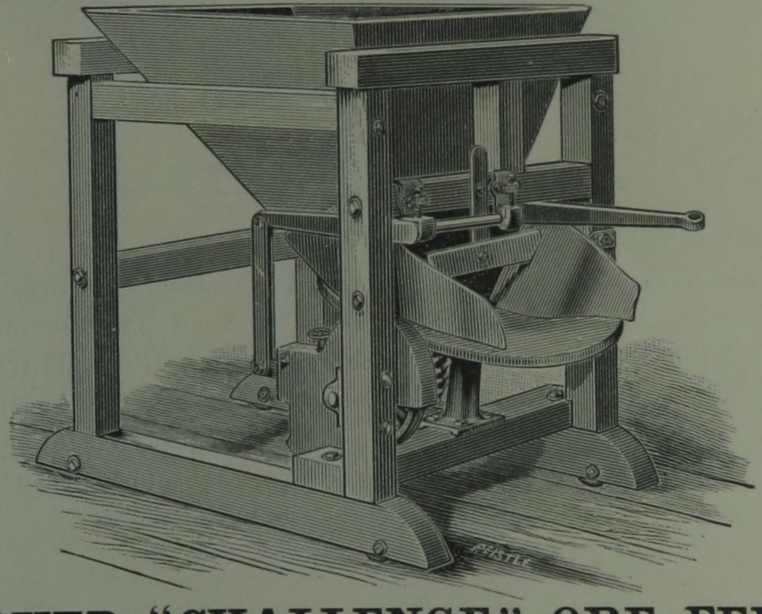


ORE BIN GATE IRONS.

We build two styles of irons for Ore Bin Gates. No. 1 Gates with wood doors and guides, rack and pinion, ratchet, wheel and pawl, shaft, hand wheel and boxes. No. 2 Gates with plate iron doors and iron guides, hand wheel, shaft and boxes, ratchet wheel and pawl, rack and pinion.

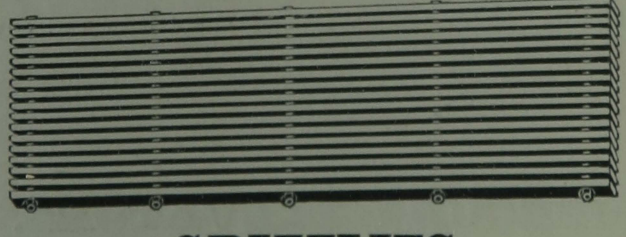
LIST.

Width of Door. Inches.	Height of Door. Inches.	Number 1.		Number 2.	
		With 1 Rack and Pinion.	With 2 Racks and Pinions.	With 1 Rack and Pinion.	With 2 Racks and Pinion.
24 to 26	28 to 30	$ 9 00	$12 00	$18 00	$22 00
28 to 30	30 to 32	11 00	15 00	22 00	26 00
30 to 36	32 to 36	14 00	18 00	30 00	35 00



IMPROVED "CHALLENGE" ORE FEEDERS.

The "Challenge" Feeders are packed ready for shipment in one frame (wood), well clamped together, and four separate pieces measuring about 23 cubic feet, and all weighing 750 pounds.
Price $100 00



GRIZZLIES.

The Grizzley is built in the woodwork above the ore bin at an angle of thirty-five to forty degrees. All ores brought to the mill are dumped on the Grizzley. What is fine enough passes through to the ore bins, the oversize to the crushers.

Numbers.	Size of Grizzley. Feet.	Size of Bar. Inches.	Mesh. Inches.	Weight. Pounds.	Price.
1	3½ x 8	⅝ x 1¾	1	800	$ 40 00
2	4 x 8	¾ x 2	1	900	45 00
3	4 x 10	¾ x 2	1	1120	56 00
4	4 x 10	¾ x 3	2	1380	69 00
5	5 x 10	¾ x 4	2¼	2340	117 00

We also furnish grizzlies with slotted rests, so that bars can be easily changed.

THE HUNTINGTON CENTRIFUGAL ROLLER QUARTZ MILL

Is now in its tenth year of use as a competitor to all kinds of mills for crushing quartz, and is strongly established in the favor of mining men. The mills are now used in the following States and Territories: California, Oregon, Washington, Alaska, Idaho, Montana, Utah, Colorado, Arizona, New Mexico, Massachusetts and New York; also in the Mexican States of Sonora, Sinaloa, Chihuahua, Guanajuata, Zacatecas and Mexico; also in Peru, Chili, San Salvador, Venezuela and other countries in Central and South America.

Mining and milling men are cordially invited to examine the system of milling and amalgamating ores in the following particulars, viz:

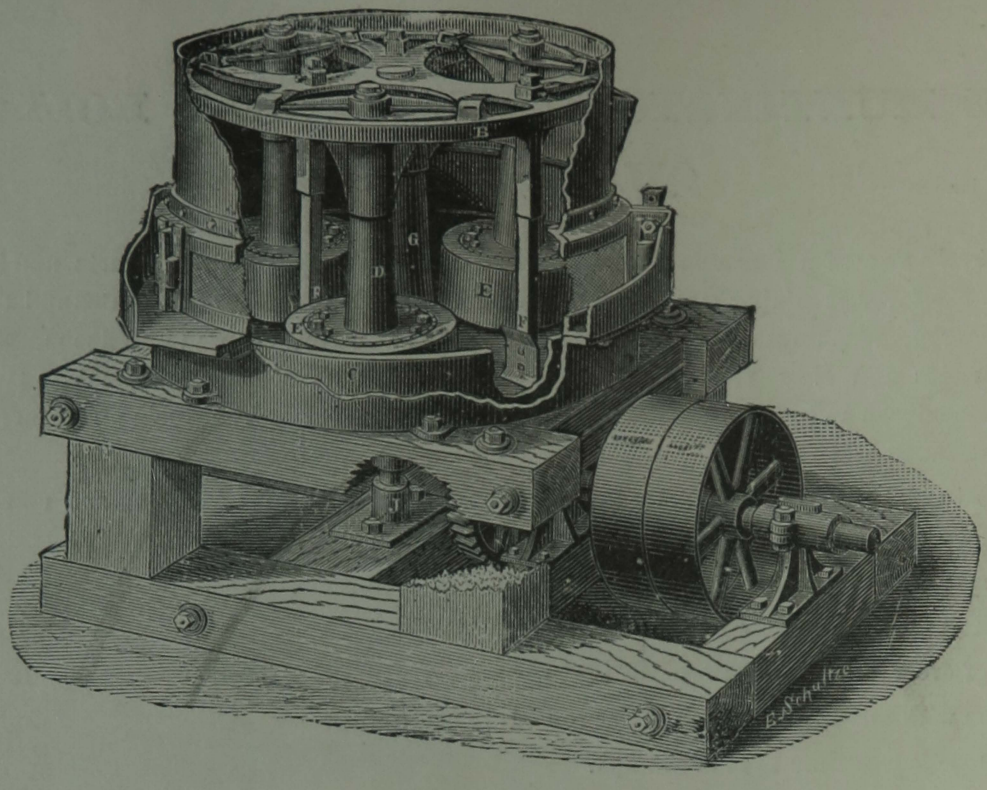
1. The cost of same capacity is not more than one-half that of stamps.
2. Freight to mine one-fourth that of stamps.
3. Cost of erection at mine one-tenth that of stamps.
4. It runs with one-third the power per ton of ore crushed.
5. The wear is less than that of stamps.
6. The wearing parts are easily duplicated.
7. It has a much better discharge, and leaves the pulp in better condition for concentrating.
8. It is a better amalgamator, saving fully nine-tenths of the gold in the mill (the balance can be saved on plates in the usual manner.)
9. Its simplicity of construction obviates the need of mechanical skill.
10. It is continually crushing, not, like the stamp, using power to suspend it in air ninety-nine one-hundredths of the time, and the balance, making a thundering noise and accomplishing *comparatively* small results. It is as far in advance of the stamp mill as the present method of making flour with improved rolls is over the Indians' mode of crushing corn in a stone mortar.

We claim especial merit in that feature of this system *which prevents* ALL FLOURING of gold and quicksilver, and the consequent loss of gold that attends stamp milling.

For the economical working of ore that contains sulphurets, we particularly claim the adaptation of this mill. The rotary method of crushing the ore so granulates the pulp (which is discharged the moment it is crushed) that a complete concentration of sulphurets is rendered most easy.

The ore and water being fed into the mill at the hopper, the rotating rollers and scrapers throw the ore against the ring die, where it is crushed to any desired fineness by the centrifugal force of the rollers as they roll over it.

The water and pulverized ore are thrown against and through the screens when fine enough. The discharge is so perfect that it makes little or no slimes, and leaves the pulp in good condition for concentration. The rollers are suspended, leaving a space of one inch between them and the bottom of the mill thus allowing them to pass freely over the quicksilver and amalgam without grinding it or throwing it from the mill, while it agitates the pulp sufficiently to make amalgamation perfect. For wet crushing and gold-saving it has no equal.



IMPROVED HUNTINGTON MILLS.

FOR CONCENTRATION.

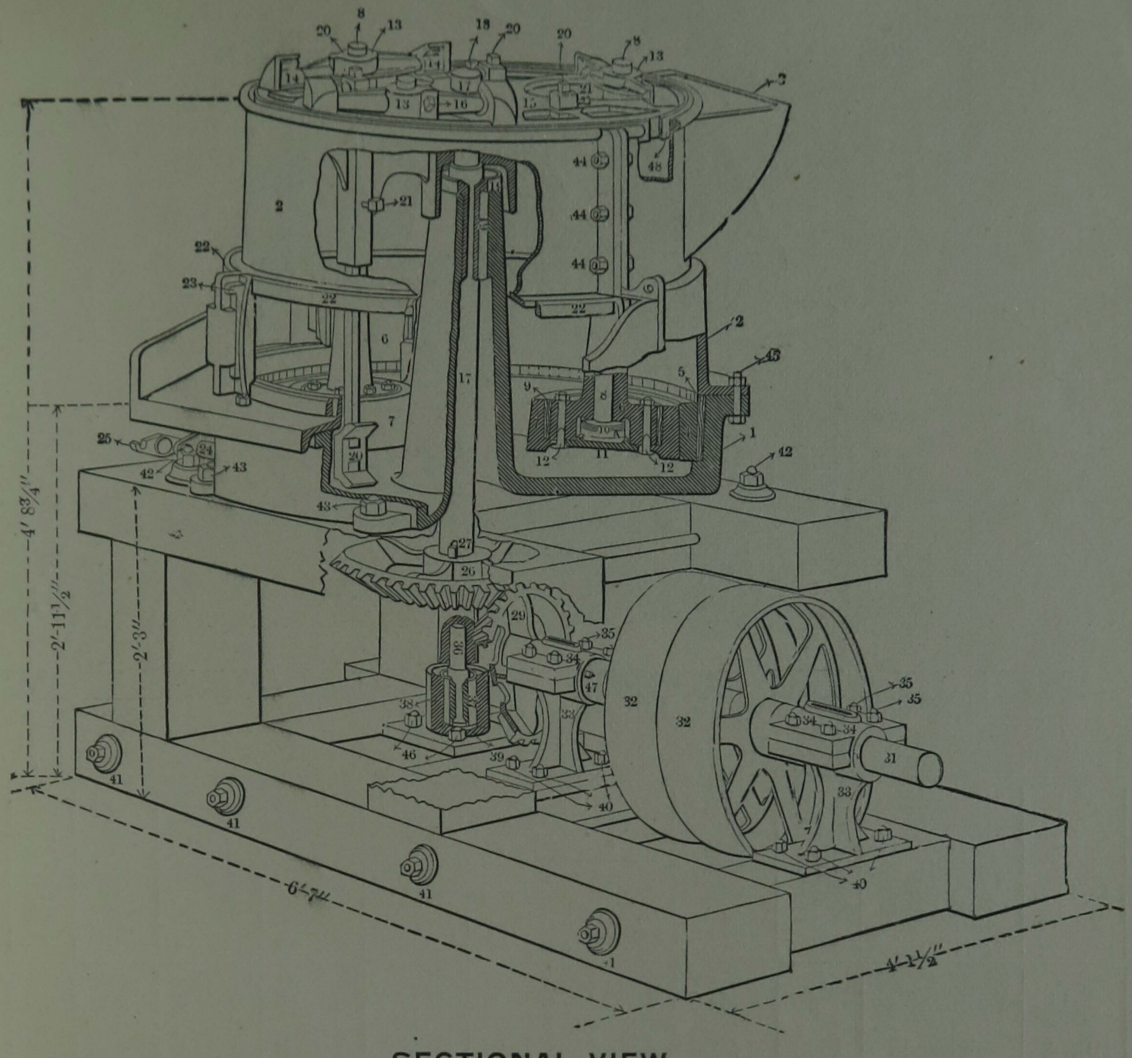
For fine concentration purposes, the Huntington Mill pulverizes ore and leaves it in a better condition for concentration than any other machine in the market, for the reason that it crushes wet, and the screen surface is large, allowing the ore to be discharged as soon as it is fine enough to pass through the screens.

Cut shows the Improved Huntington Mill as adapted for concentration works, either for crushing coarse or direct from the crusher, to a fineness suitable for fine concentration, or for receiving coarse tailings from coarse concentration works, to be re-crushed for passing over Frue Vanning Machines, or other sensitive slime concentrating machinery.

The cut shows the Improved Huntington Mill as designed by ourselves, and we commend it to our customers as being a splendid machine for the purposes enumerated above. As a gold saving appliance, combined with crushing machinery, it has no equal. For concentrating purposes it is perfection itself.

To parties who have been accustomed to the use of these machines in the past, we would especially call attention to the *improved design and greater strength of the Mill* as now designed and illustrated in this catalogue. We have endeavored to eliminate all the weak points and features of the old mill, and submit the Improved Huntington Mill as the par excellence of wet pulverizing machinery.

PRICES ON APPLICATION.



SECTIONAL VIEW.

3½ Ft. HUNTINGTON MILLS.

For 5 Ft. Mill, dimensions of height and framing are:

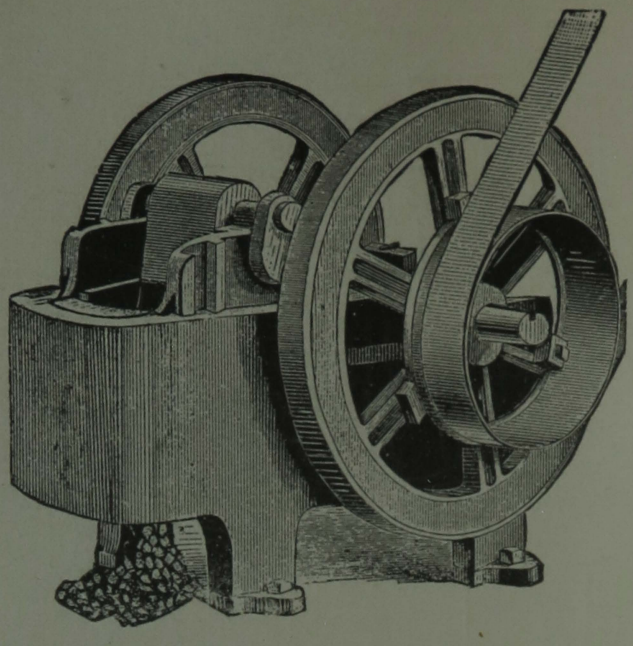
5 feet 8 inches instead of 4 feet 8¾ inches.
3 feet 4 inches instead of 2 feet 11½ inches.
2 feet 10 inches instead of 2 feet 3 inches.
5 feet 6 inches instead of 4 feet 1½ inches.
10 feet instead of 6 feet 7 inches.

THIS LIST WILL BE FOUND CONVENIENT IN ORDERING REPAIRS.

No.
1 Bottom, with Cone Cast on.
2 Housing, with Feed Hopper cast in two pieces.
3 Feed Hopper.
4 Steel Ring die for roller to run against.
5 Wood Packing for Ring Dies.
6 Roller head, with long hub attached.
7 Roller shells of *Steel*.
8 Roller Shaft, with Head A forged on.
9 Wood Packing for Roller Shells.
10 Anti-Friction Rings, carrying rollers.
11 Cover for Oil Recess, fitted with rubber gasket.
12 Draw Bolts to hold roller shells.
13 Yokes for carrying rollers.
14 Yoke Journals, removable.
15 Disk Driver, keyed to upright spindle and carrying rollers and scrapers.
16 Key in yokes.
17 Upright Spindle to which disk driver is keyed.
18 Key in upright spindle.
19 Removable Sleeve-bearing, in cone for spindle.
20 Scrapers.
21 Keys for scrapers (1 for each scraper).
22 Screen Frames—3 frames to each machine.
23 Screen Frame Keys—6 keys to each machine.
24 Discharge.

No.
25 Cover for Discharge.
26 Bevel wheel, keyed to upright spindle.
27 Shaft Key for bevel wheel.
28 Cross-Key for bevel wheel (not shown).
29 Bevel Pinion keyed to counter-shaft.
30 Key for bevel pinion (not shown).
31 Counter-shaft.
32 Pulleys—tight and loose.
33 Stands for counter-shaft (Babbited).
34 Caps for stands (Babbited).
35 Bolts for stand caps.
36 Steel Toe for spindle, removable.
37 Bushing for toe-bearing.
38 Step-bearing for spindle.
39 Steel Button for step-bearing.
40 Bolts for stands.
41 Horizontal Frame Bolts.
42 Vertical Frame Bolts.
43 Frame Bolts for bottom casting.
44 Bolts for housing.
45 Bolts for housing flange.
46 Bolts for step-bearing.
47 Collar and Set Screw for counter-shaft.
48 Wrought Iron Band around disk driver.

PRICES ON APPLICATION.



THE BLAKE STONE AND ORE BREAKERS.

LIST.

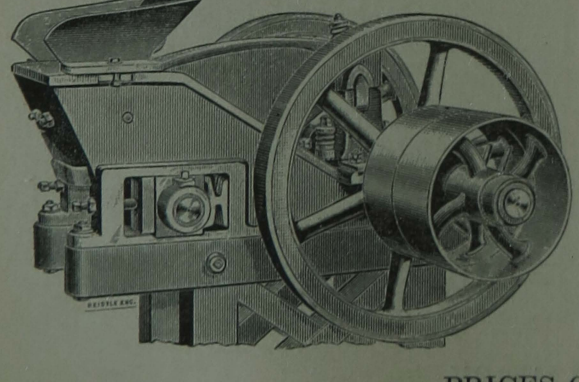
Numbers.	Size. Inches.	Capacity Crushed to Two Inches. Cubic Yards.	Weight of Heaviest Piece. Pounds.	Total Weight. Pounds.	Extreme Dimensions.						Driving Pulley.				Proper Speed.	Horse Power Required.	Price.
					Length.		Breadth.		Height.		Diam.		Face.				
					Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.			
...	3x1½	Laboratory	40	100	1	1	0	6	0	10	0	5	0	1	250	...	$ 50 00
A	10x 4	Three	1993	4700	4	6	4	0	3	11	1	8	0	6	250	4	300 00
2	10x 7	Five	3950	8000	5	4	4	6	4	5	2	0	0	7½	250	7	500 00
5	15x 9	Eight	7189	16000	6	8	5	0	5	3	2	6	0	9	250	10	900 00
8	20x10	Ten	7700	17000	6	10	5	9	5	11	3	0	0	12	250	14	.....

NOTE.—The amount of product depends on the distance the jaws are set apart and the speed. A cubic yard of stone is about one and one-third tons.

☞In getting an engine to drive one of these crushers, it is advised to have one of greater power than is stated in the table.

THE DODGE CRUSHERS.

LIST.



Numbers.	Sizes of Jaw Openings Inches.	Diameter of Pulleys. Inches.	Width of Belt Used. Inches.	Horse Power Required.	Number Tons Per Hour, Nut Size.	Revolutions Per Minute.	Weight Complete. Pounds.	Price Complete.
1	7x10	24	6	4 to 8	1 to 3	235	4000	.....
2	9x15	30	8	8 to 12	3 to 6	200	7000	.....

PRICES ON APPLICATION.

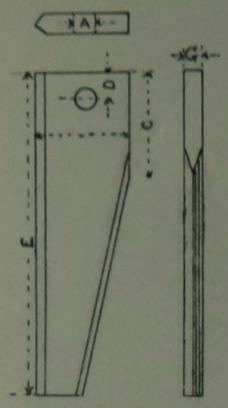


FIG. 1.

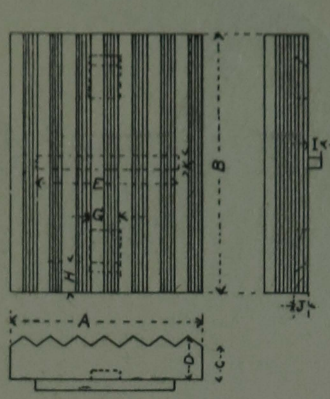


FIG. 2.

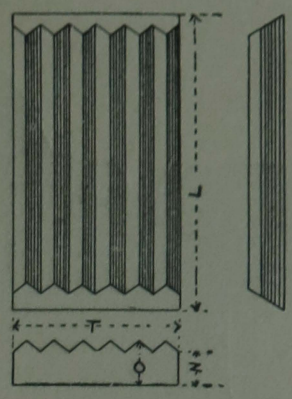


Fig. 3.

JAW PLATES FOR BLAKE CRUSHERS.

FIG. 1. SIDE PLATE. Give dimensions A, B, C, D, E, F, G, H, in inches and fractions.
FIG. 2. FIXED JAW PLATE. Give dimensions A, B, C, D, E, F, G, H, I, J, K, in inches and fractions. Specify make and size of crusher, and number of corrugations in plates.
FIG. 3. SWING JAW PLATE. Give dimensions L, M, N, O, P, Q, R, S, T, in inches and fractions.

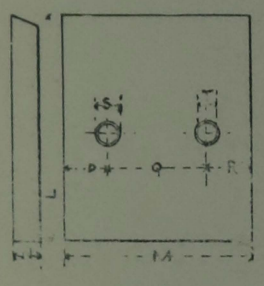


FIG. 1.

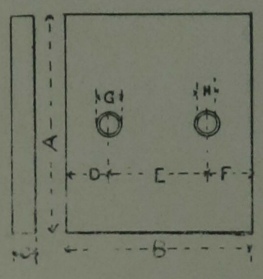


FIG. 2.

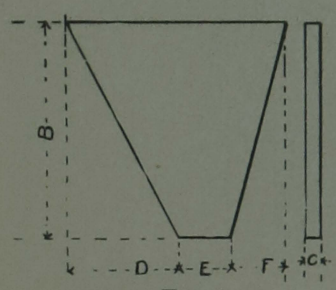


FIG. 3.

JAW PLATES FOR DODGE CRUSHERS.

FIG. 1. FIXED JAW PLATE. Give dimensions L, M, N, P, Q, R, S, T, in inches and fractions.
FIG. 2. SWING JAW PLATE. Give dimensions A, B, C, D, E, F, G, H, in inches and fractions.
FIG. 3. SIDE PLATE. Give dimensions B, C, D, E, F, in inches and fractions. Specify size of crusher.

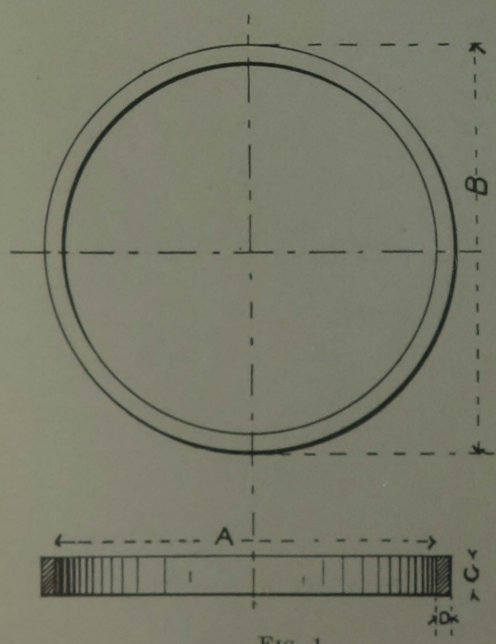


FIG. 1.

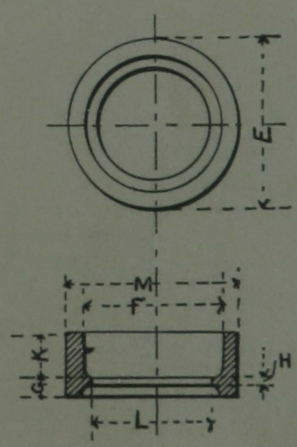
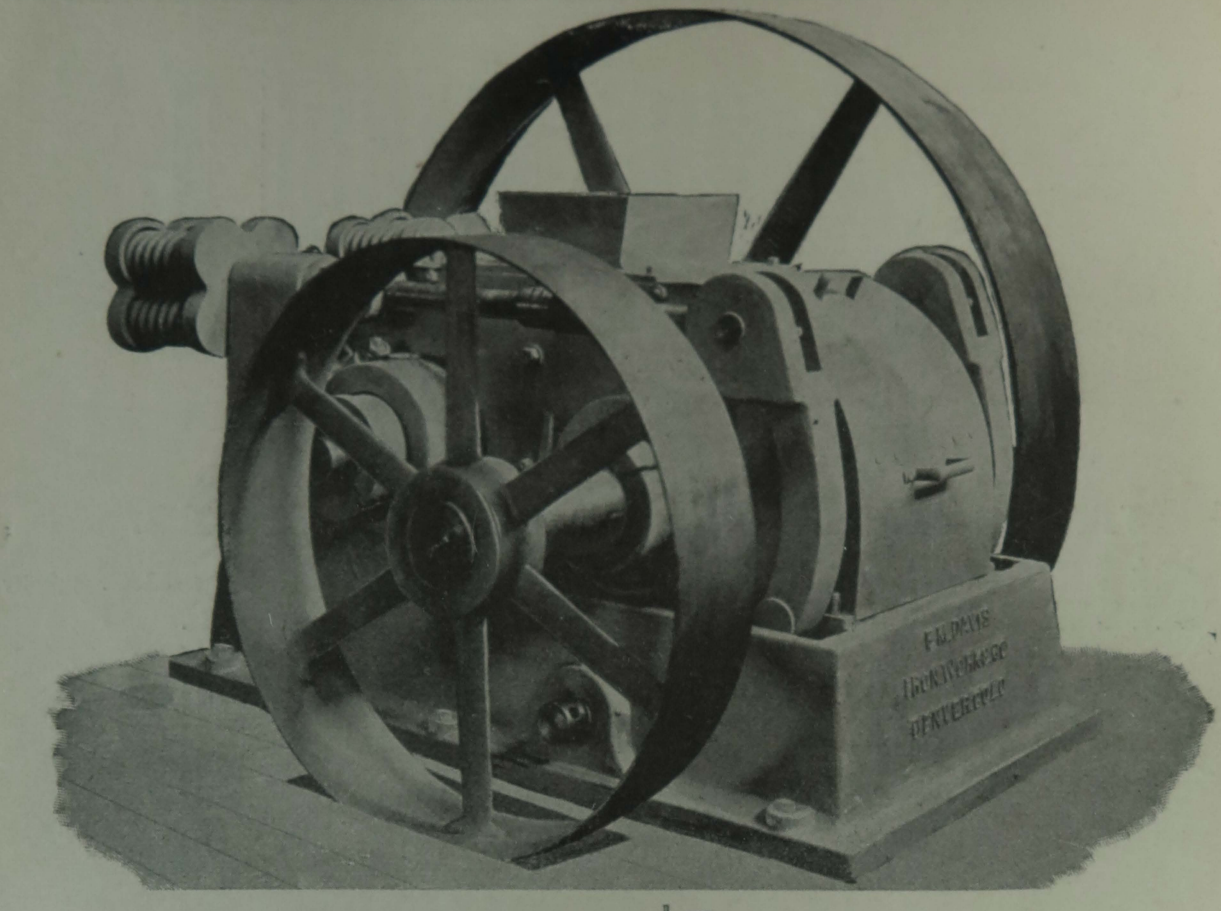
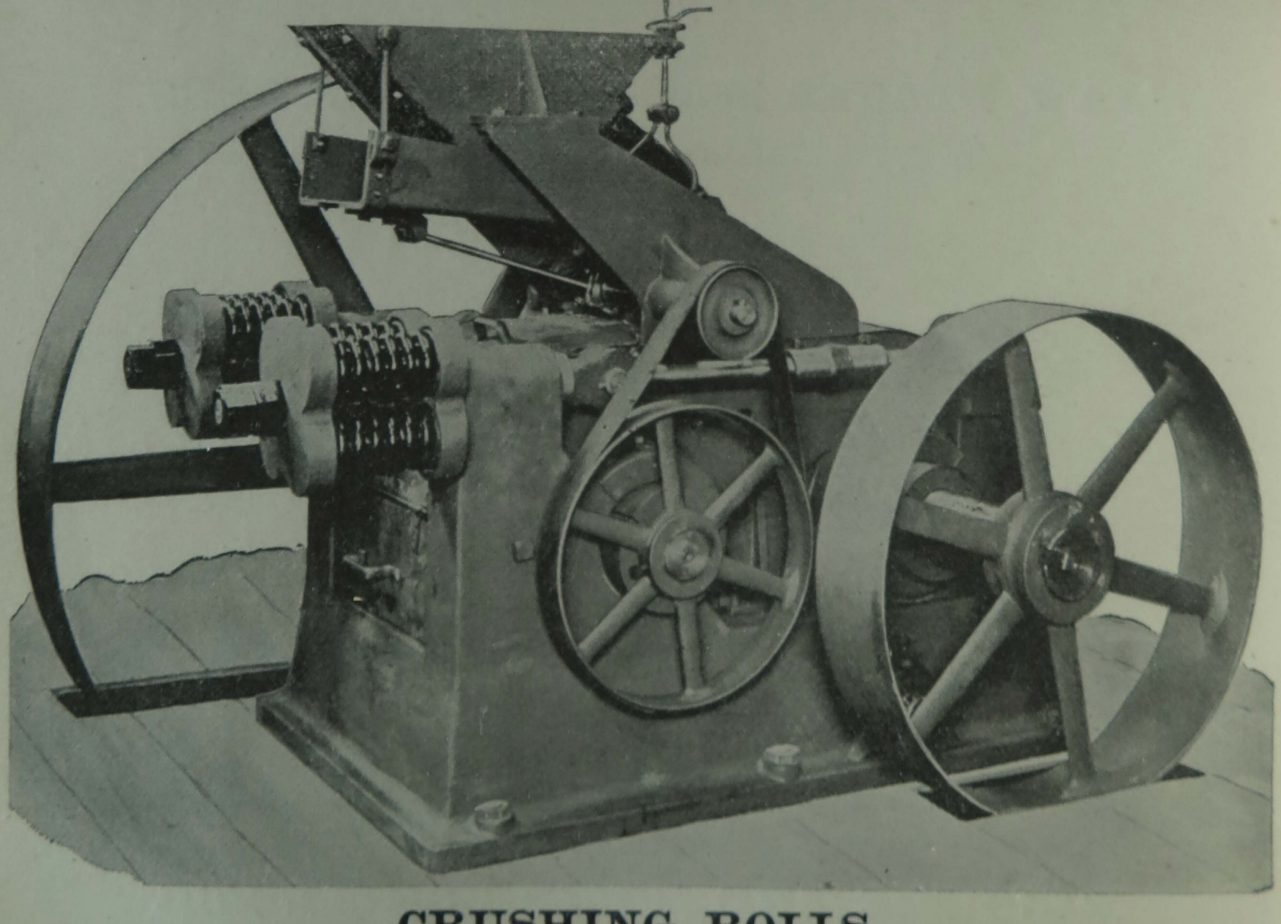


FIG. 2.

RING DIE AND ROLLER SHELL FOR HUNTINGTON MILLS.

FIG. 1. RING DIE. Give dimensions A, B, C, D, in inches and fractions.
FIG. 2. ROLLER SHELL. Give dimensions E, F, G, H, K, L, M, in inches and fractions. Specify size of mill.

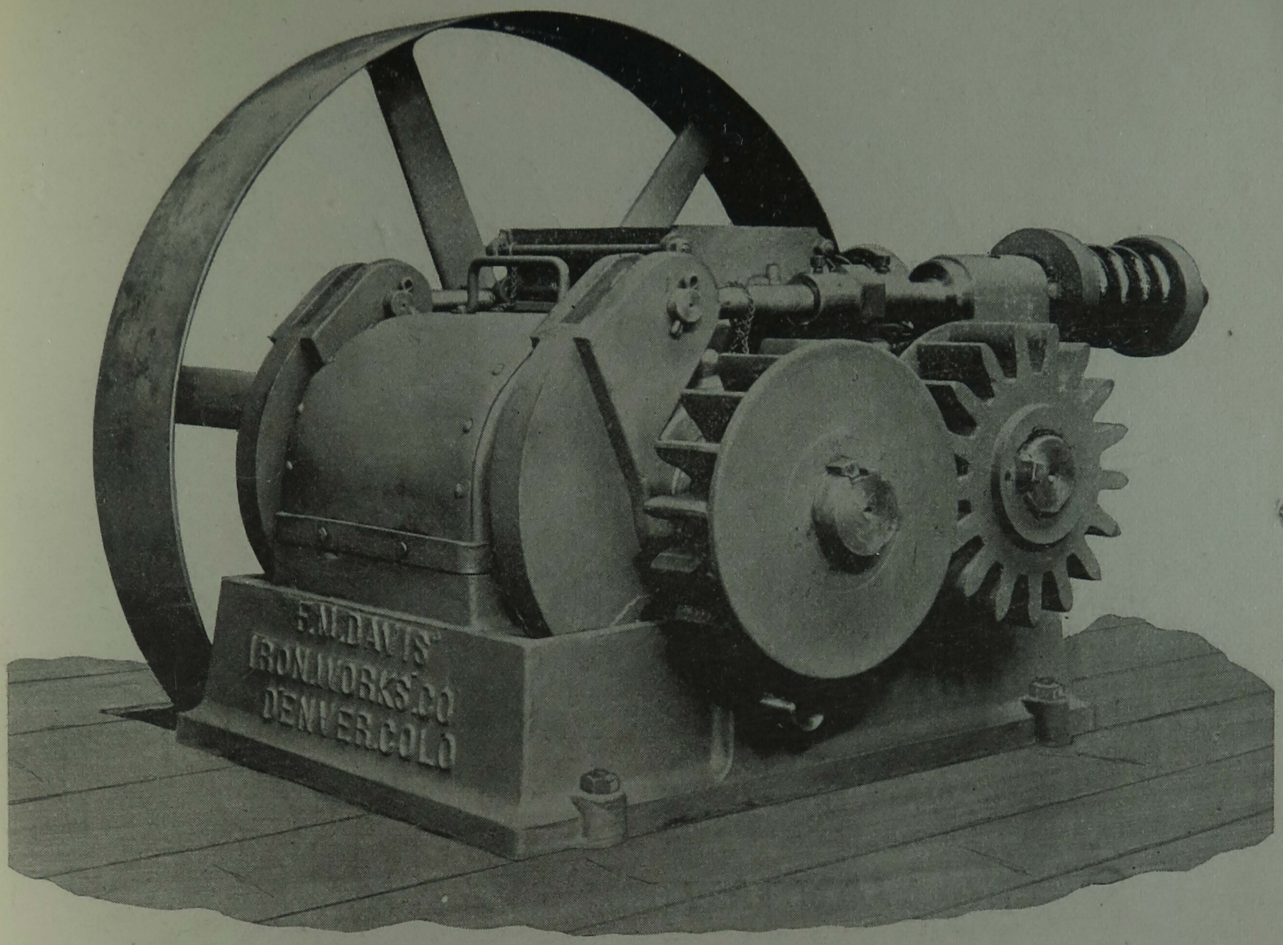




CRUSHING ROLLS,

WITH AND WITHOUT FEEDER.

(BELTED.)



CRUSHING ROLLS.

(GEARED.)

BELT DRIVEN ROLLS.

LIST.

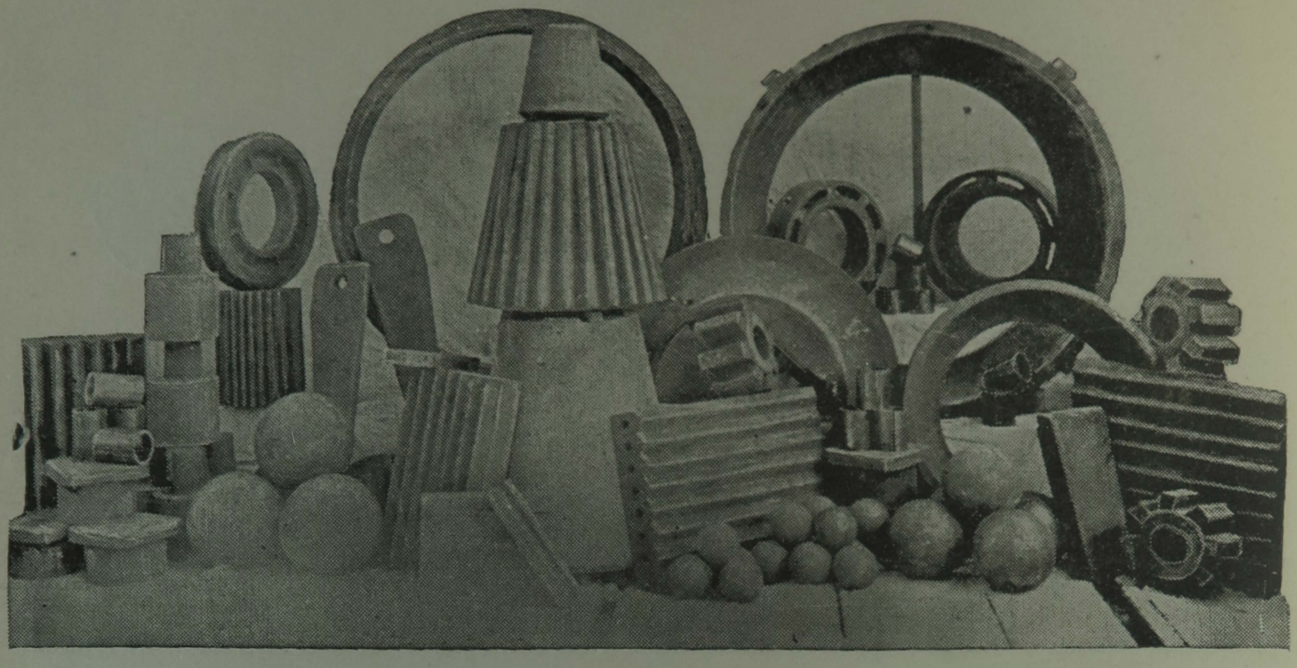
Size of Roll. Inches.	Weight. Pounds.	Size of Main Band Wheel. Inches.	Size of Small Band Wheel. Inches.	Revolut'ns Per Minute.	Capacity to ¼-Inch Per Hour.	Capacity to 30 Mesh Per Hour.	Price, With Feeder.	Price, Without Feeder.
12 x 12	3200	48 x 8	24 x 6	150	.....	.....	$ 380 00	$ 335 00
12 x 20	6000	60 x 10	30 x 6	120	.....	.....	735 00	675 00
14 x 27	12000	80 x 12	40 x 8	100	.....	.....	1000 00	900 00
16 x 36	15000	96 x 12	48 x 8	80	.....	.....	1400 00	1300 00

GEARED ROLLS.

LIST.

Size of Roll. Inches.	Weight. Pounds.	Size Countershaft Pulleys. Inches.	Revolutions of Pulleys.	Revolut'ns of Rolls.	Capacity to ¼-Inch Per Hour.	Capacity to 30 Mesh Per Hour.	Price, With Feeder.	Price, Without Feeder.
12 x 12	3600	20 x 6	260	60	.....	.....	$ 400 00	$ 355 00
12 x 20	6500	28 x 8	260	60	.....	.....	835 00	785 00
14 x 27	13000	40 x 10	240	50	.....	.....	1100 00	1000 00
16 x 36	17000	48 x 12	180	40	.....	.....	1550 00	1450 00

SNC



MANGANESE STEEL.

During the past two years MANGANESE STEEL has become widely known and generally introduced in this country for a great variety of purposes for which it is peculiarly adapted.

Among these uses may be named in particular:

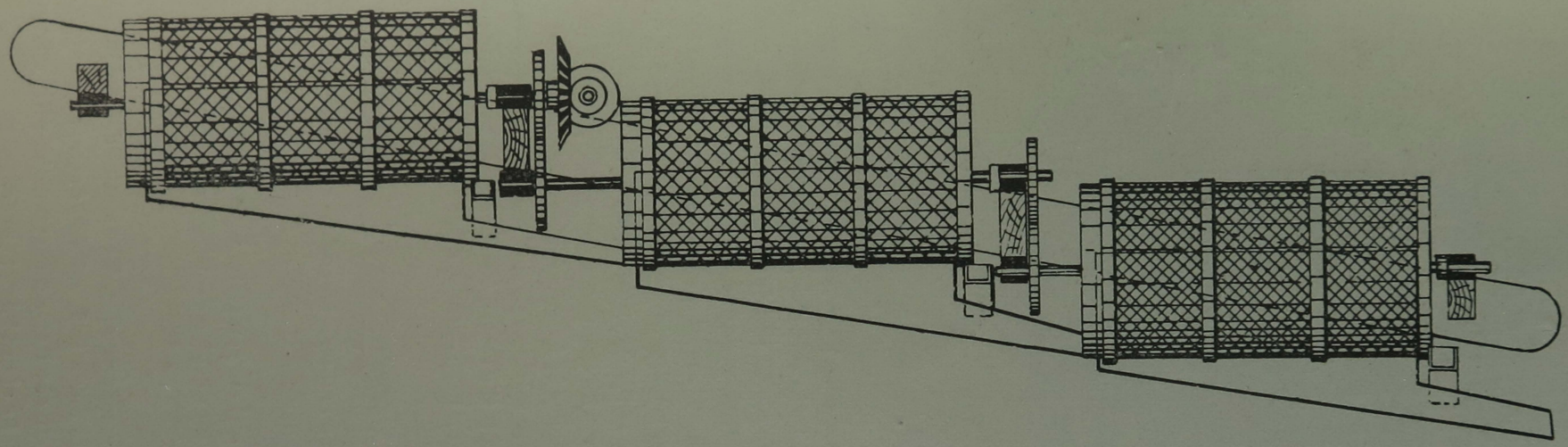
1. The wearing parts of crushing and grinding machinery.
2. Rings for polishing granite.
3. Pins, bushings, bucket knives or nose pieces, picks, hawse pipes, etc., for dredges, etc.
4. Mine car and skip wheels.

It has also been used more or less extensively in this country or in England for sheaves; for road scrapers, plows and picks; for electric motor wheels and motor pinions, etc., and for many other mechanical devices where toughness and hardness combined are required. Also for rheostats and other parts of electrical machines, where its special electrical characteristics give it a value.

Plates frequently, and even ordinary steel sometimes, break, while MANGANESE STEEL plates have been free from this fault.

In toggle plates we have no record of a single one of MANGANESE STEEL breaking or chipping off along the edge, or across the corner, as is so often the case with iron plates, nor have we yet any account of a worn out MANGANESE STEEL toggle. The breaking of a toggle plate often spoils the toggle bearings for use.

MANGANESE STEEL will wear in jaws from three to six times as long, and in some cases even more, and does not break nor spall off in service. The important saving of time ordinarily lost in the frequent changing of worn out and broken plates is said in some cases to more than offset the difference in cost—incidentally the saving of freight and handling amounts to a considerable item.

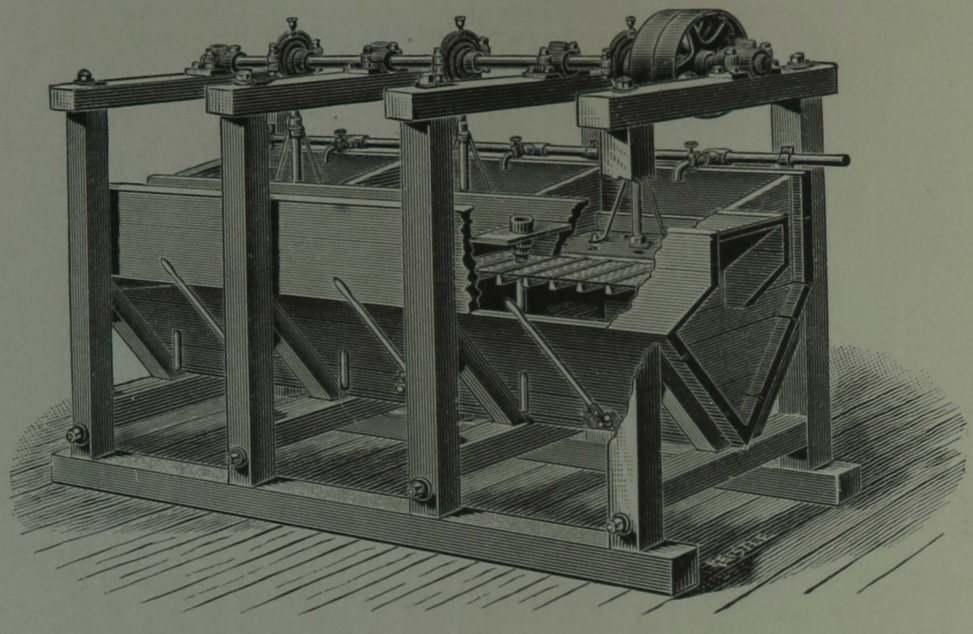


REVOLVING SCREENS.

Sizing screens constitute a very important part of a coarse concentration mill, as the success of the treatment depends upon effective sizing, which is followed by the proper separation of the sized particles according to the specific gravity of the various minerals of the ore to be treated. This plate shows a common arrangement of three revolving screens in which either perforated metal or wire cloth may be used. Bevel gearing is shown driving the first screen, which communicates motion by spur wheels to successive screens having finer perforations or meshes, and being placed at lower levels. In concentrating works, sets of four or more such screens are usually employed. The first screen takes out all pieces too large for the processes of ore treatment, that they may be returned to the crushing machinery. The remainder passes through the perforations of the first screen, and is conveyed to the second screen, and so on through the set, each screen furnishing a product sized between the limits of its perforations and the perforations of the preceding screen, and the last screen also a product of all that passes the finest perforations.

We manufacture Revolving or Shaking Screens for wet or dry screening, with wire cloth or punched metal screens.

PRICES ON APPLICATION.



JIGS.

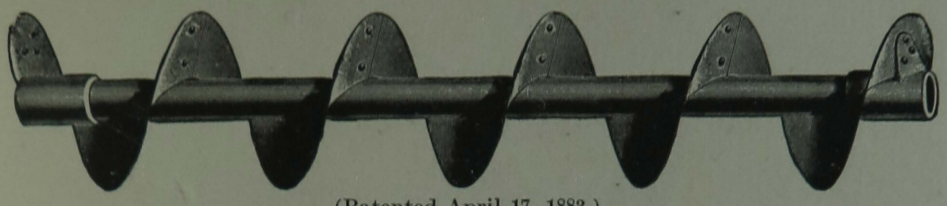
This is the general name for the concentrating machine universally employed for coarse material, and covers a great variety of designs, practically all alike in principle, and differing little in work done if conditions are equally favorable to each. The principle on which all the well-known forms of jigs work is the tendency of a mixture of ore particles of approximately similar size, but varying specific gravity, to arrange itself into layers according to gravity when allowed freedom of motion by means of a pulsating column of water. The ordinary type of jig consists of a water tank divided by a partition above, which does not reach the bottom. On one side of the partition is fixed a horizontal screen, on which the sized ore is fed; on tne other side a loosely working plunger operated vertically by crank or other reciprocating device. The action of this plunger is to cause a regular pulsation of water through the screen, and so affecting the particles of ore resting thereon that the heavier ones settle down through the lighter, and either discharge through the screen itself or by appropriate gate above screen level, while the lighter particles of rock move on horizontally, discharging over side or end of screen frame.

Jigs are usually 1, 2, 3 or 4 compartment, the last being generally used when more than two products are required, as, for instance, a mixture of galena and zinc blende in rock, or galena with iron or copper pyrites.

We make all approved designs of jigs, supplying them complete, with tanks and wood work, or, if preferred, make simply the iron work, and furnish full working drawing for the construction of wood work at the mines.

The above plate represents a Hartz Jig of three compartments. The motion derived by eccentrics, which are adjustable from 0 to 2 inches. These jigs are made in 1, 2, 3 and 4 compartments, the 3 and 4 compartment being most common. A three-compartment Hartz Jig complete, with all wood work weighs 2,000 pounds, and a four-compartment jig weighs about 2,500 pounds.

PRICES ON APPLICATION.



(Patented April 17, 1883.)

SPIRAL STEEL CONVEYERS.

The Flights are made of steel.

All Flights are stamped out with dies, insuring a true and smooth running Conveyer.

Our patent method of securing the end Flights by means of the collar and broad lug in one piece, insures greater strength than any other method.

All Conveyer shafts, after being straightened, are put into a lathe, and the bearing in collar turned perfectly true.

LIST.

Outside Diameter. Inches.	Standard Length. Feet.	Inside Diameter of Hollow Shaft. Inches.	Regular Diameter of Projections. Inches.	Maximum Capacity Per Hour. Bushels.	Recommended Revolutions Per Minute.	Price Per Foot.
3	8	$\frac{13}{16}$	$\frac{3}{4}$	60	250	$1 00
4	8	1	1	100	220	1 00
5	10	$1\frac{1}{2}$	$1\frac{1}{2}$	200	210	1 67
6	10	$1\frac{1}{2}$	$1\frac{1}{2}$	350	200	1 67
8	10	$1\frac{1}{2}$	$1\frac{1}{2}$	780	180	2 00
9	10	$1\frac{1}{2}$	$1\frac{1}{2}$	1100	175	2 00
10	10	$1\frac{1}{2}$	$1\frac{1}{2}$	1400	160	2 80
12	12	2	2	2000	150	2 80
14	12	2	2	3400	140	3 75
16	12	2	2	5000	130	3 75
16	12	3	$2\frac{15}{16}$	5000	130	5 08
18	12	3	$2\frac{15}{16}$	6000	120	6 15

Includes Connecting Journals, Hangers and Curved Iron Lining for Box.

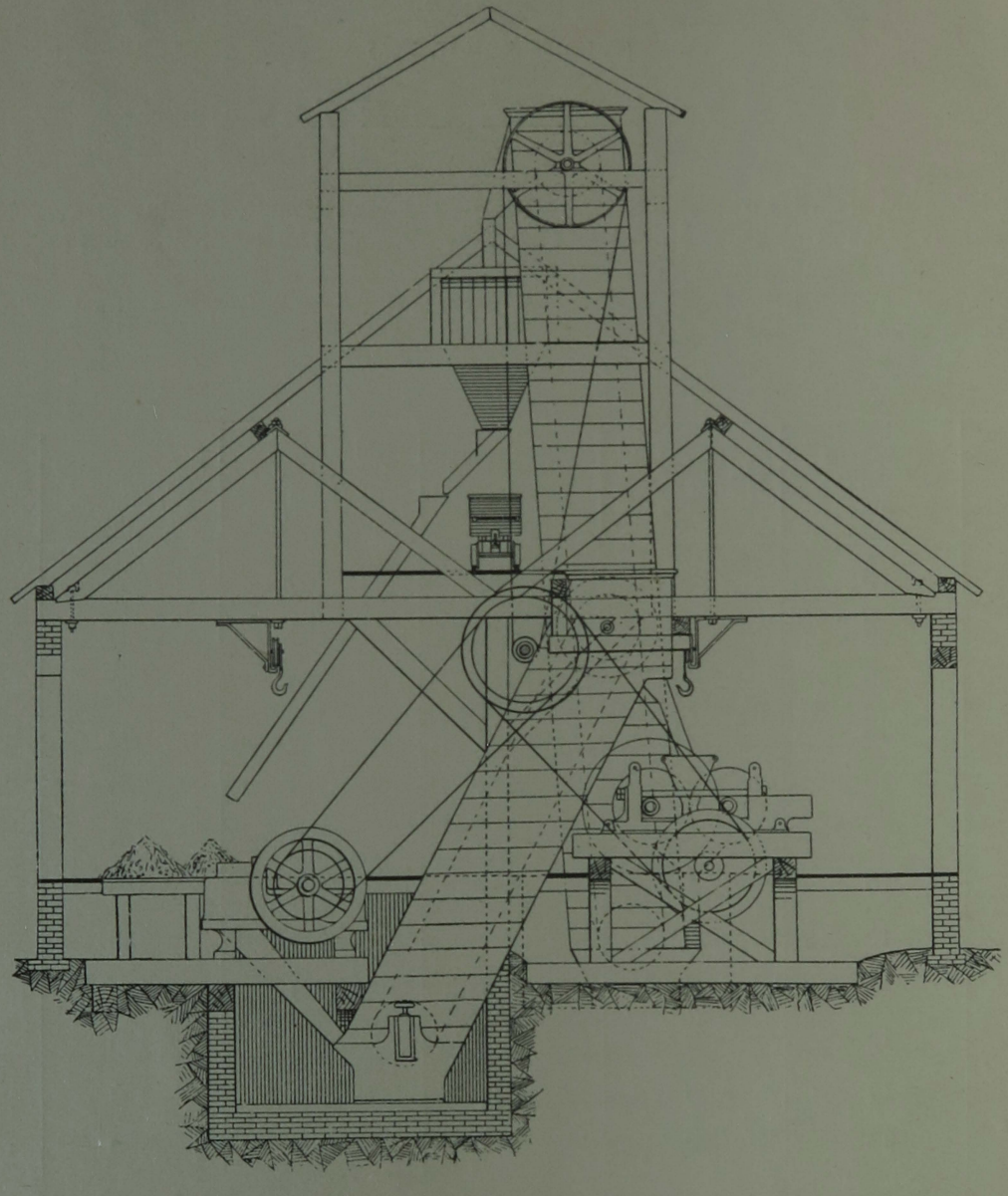
GALVANIZED STEEL CONVEYERS.

LIST.

OUTSIDE DIAMETER IN INCHES.											
3 Inches.	4 Inches.	5 Inches.	6 Inches.	8 Inches.	9 Inches.	10 Inches.	12 Inches.	14 Inches.	16 Inches on 2-Inch Shaft.	16 Inches on 3-Inch Shaft.	18 Inches.
$1 28	$1 28	$2 03	$2 03	$2 68	$2 68	$3 48	$3 48	$4 38	$ 4 83	$ 6 38	$7 79

In all other respects, information given in table above applies to Galvanized Conveyer.

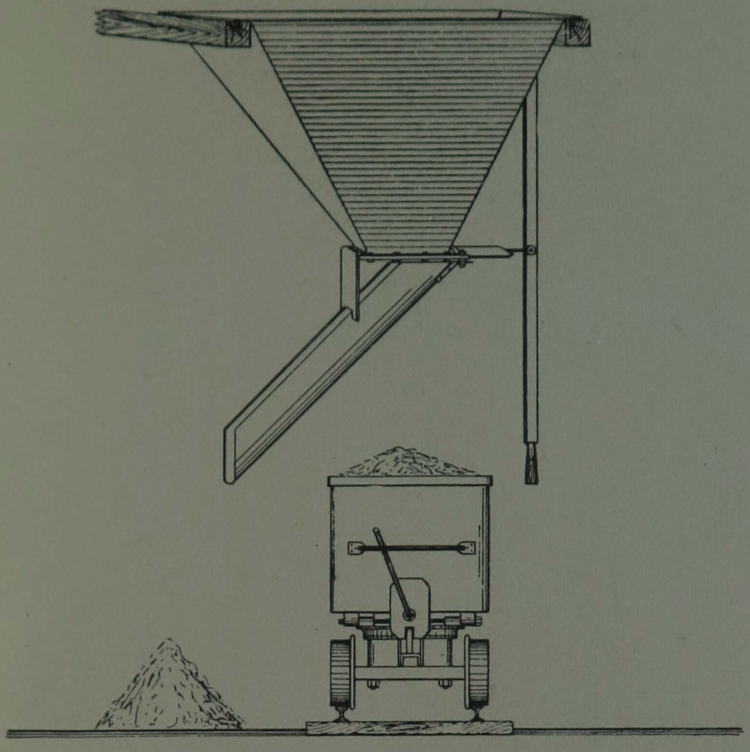
An extra charge is always made for driving ends, including the part going into pipe.



CRUSHING AND SAMPLING MILLS.

This cut shows a cross-section of the Sampling Mill designed and built by us for the State Ore Sampling Company. This is the most complete custom Sampling Mill in the West. It is automatic in action. The ore does not have to be handled after it is fed into the crusher until it is in the car.

Plans, specifications and prices for mills of any capacity.



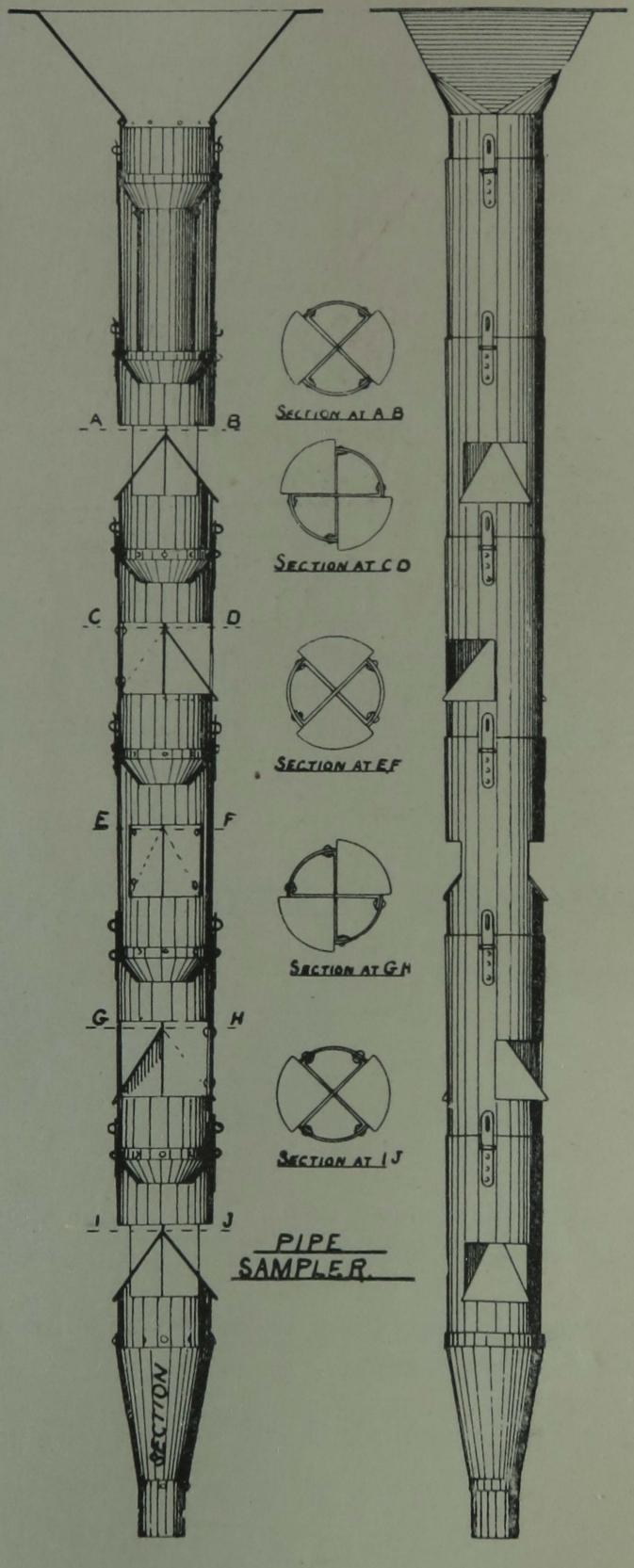
AUTOMATIC ORE SAMPLING MACHINES.

SPLIT SHOVEL SAMPLER.

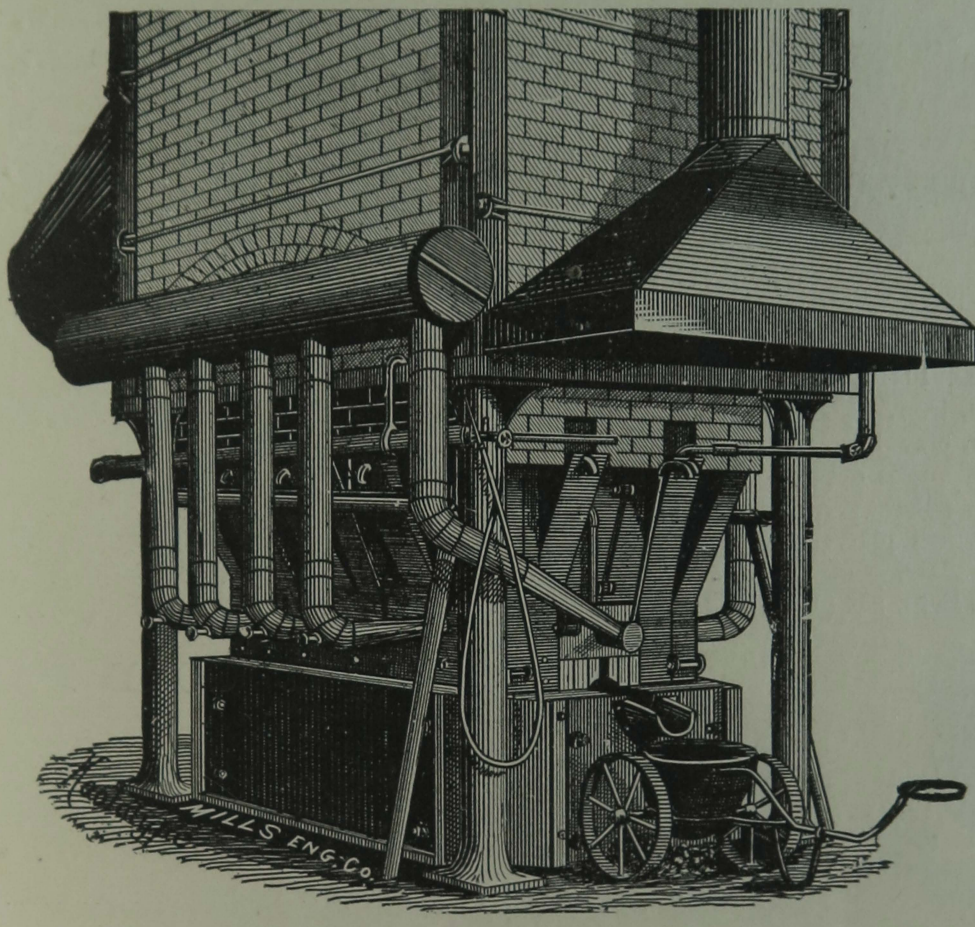
The cuts show the automatic samplers used in most of the Western sampling works, smelters, etc.

The Split Shovel Sampler is at present used in the majority of the sampling works, and is considered the most accurate of the two illustrated.

We can furnish any style of sampler now in use. Pulp samplers for stamp mill tailings, concentration works, etc.



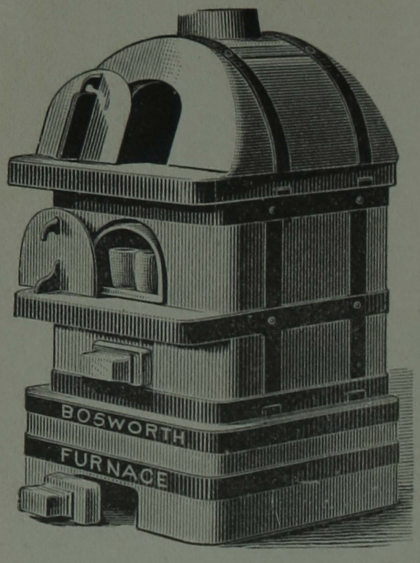
PIPE SAMPLER.



SMELTING MACHINERY.

Water Jacket Furnaces, for copper or lead ores; Slag Pots, Bullion Cars, Litharge Cars and Pots, Lead Moulds and Ladles, Cupelling Furnaces, Refining Furnaces, Reverberatory Furnaces, Revolving Roasting Cylinders, etc.

PRICES ON APPLICATION.



THE BOSWORTH FURNACES

Are made of fire clay in three sections, securely bound with heavy iron bands. The construction is such that it is less liable to crack than other furnaces. It is much more durable and convenient. Will do more work with less fuel, heating the muffle quickly and evenly. Uses 9x15 muffle; can be made to use 10x16, if desired.

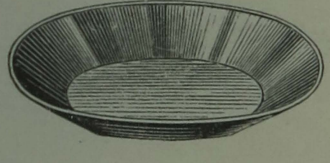
Price, securely packed, with one muffle..... $40 00

PARTS FOR BOSWORTH FURNACES.

LIST.

Extra Muffles, 9x15	$ 1 60
Extra Muffles, 10x16	2 00
Extra Doors, iron	50
Extra Doors, clay	50
Extra Plugs, muffle support	15
Extra Plugs, poker	25
Extra Plugs, ash pit	25
Extra Grate Bars, each	20
Extra Grate Bars, set (5)	1 00

MINERS' GOLD PANS.



Plain, per dozen..... $16 50
Polished, per dozen..... 19 50

MORTARS.

LIST.

Numbers	0000	000	00	0	1	2	3	4
Diameter ..... inches	3	3¼	3½	4	4½	5	6	6½
Capacity ..... ounces	2	3	4	6	11	16	24	30
Price	$0 40	$0 45	$0 50	$0 60	$0 65	$0 85	$1 00	$1 25

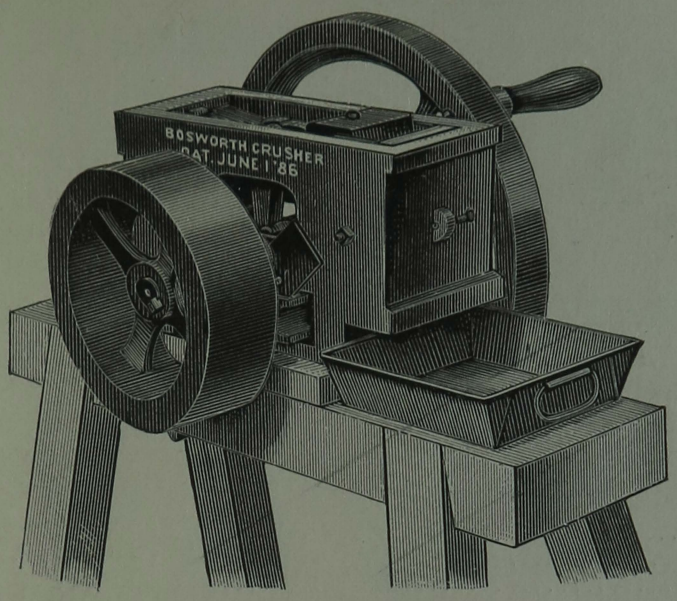
Numbers	5	6	7	8	9	10	11	12
Diameter ..... inches	7	8	8½	9½	10½	12	13	14
Capacity ..... ounces	40	48 pts.	3½	4½	7	10	13	17
Price	$1 65	$2 00	$2 50	$3 25	$4 00	$4 50	$5 25	$6 00

STANDARD FIRE BRICK.

Car Load Lots, f. o. b., Denver.

LIST.

No. 2, per 1,000	$23 00
No. 1, per 1,000	26 00
Dry Milled Clay, in sacks ..... each	1 00



THE BOSWORTH CRUSHERS.

LIST.

Hand Crusher	$30 00
Hand Crusher, with pulley	32 00

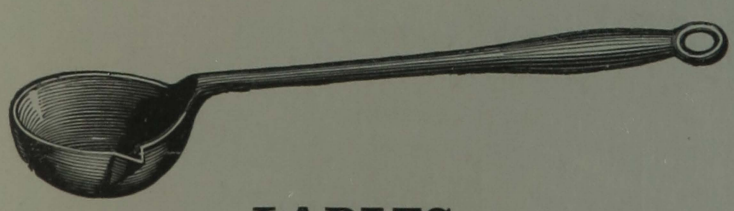
EXTRA PARTS.

LIST.

Stationary Chilled Jaw Plate	$ 50
Steel Cheek Plate and Bolts, per pair	75
Wrought Iron Movable Jaw Plate	50
Movable Jaw	2 00
Toggle Plate	50
Duplicate of Toggle Plate	50
Pitman	1 50
Steel Crank Shaft	3 00
Spring Rod	50
Eye Bolt, for attaching plate to jaw	35
Toggle Frame Bolt	10
Steel Toggle Pin	25
Movable Jaw Shoe	50

ORE SACKS.

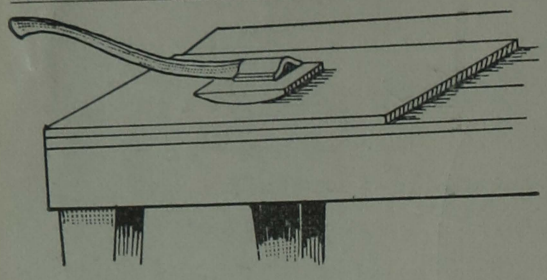
Duck, 16 inches by 24 inches	$ 0 20
Duck, "Boss," 16 inches by 24 inches	30
Jute Seamless, 16 inches by 24 inches	14



LADLES.

LIST.

Size ..... Inches	2½	3	3½	4	5	6	7	8
Standard .....per dozen	$ 3 00	$ 3 85	$ 4 40	$ 5 50	$ 7 50	$ 9 25	$.....	$.....
Extra heavy, for smelter use..	.....	.....	.....	.....	.....	18 00	21 50	27 00



BUCKING PLATES AND MULLERS.

LIST.

Size.	Price.
18 x 20	$11 00
20 x 24	14 00
24 x 36	21 00

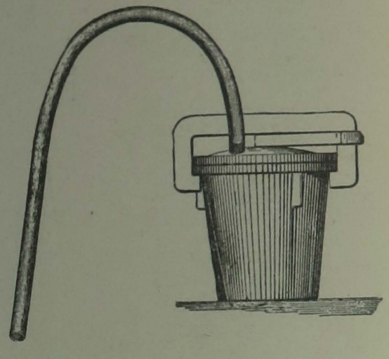
RETORTS.

The alembic and cover are turned out smooth. Cover is secured by wrought iron clamp and key.

The condenser pipe is included in price.

LIST.

One Quart	$10 00
Two Quart	15 00
One Gallon	25 00



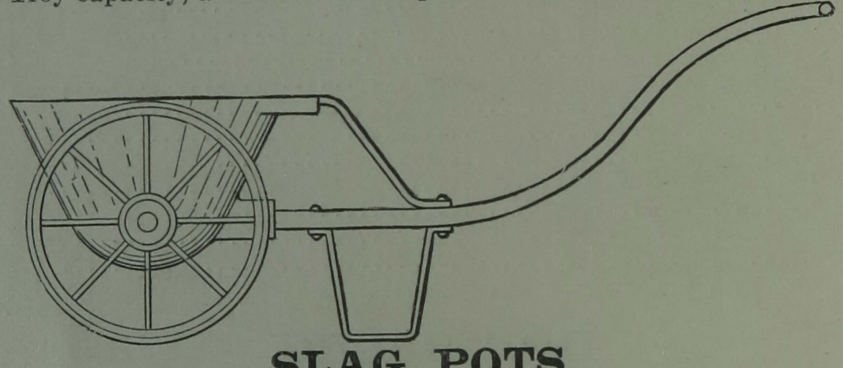
SILVER RETORTS.

These Retorts are made so that they can be reversed when the lower side becomes burnt or blistered. The furnace has three dampers for directing the flames.

The prices below include retort, front, grate and bearing bars, stack, bolts, dampers and condenser.

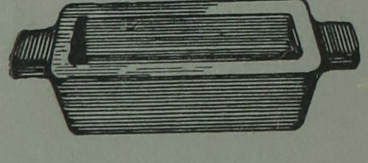
LIST.

No. 1, 200 pounds Troy capacity, all iron work complete, weighs 1000 pounds	$125 00
No. 2, 400 pounds Troy capacity, all iron work complete, weighs 1500 pounds	175 00
No. 3, 800 pounds Troy capacity, all iron work complete, weighs 2000 pounds	225 00



SLAG POTS.

PRICES ON APPLICATION.

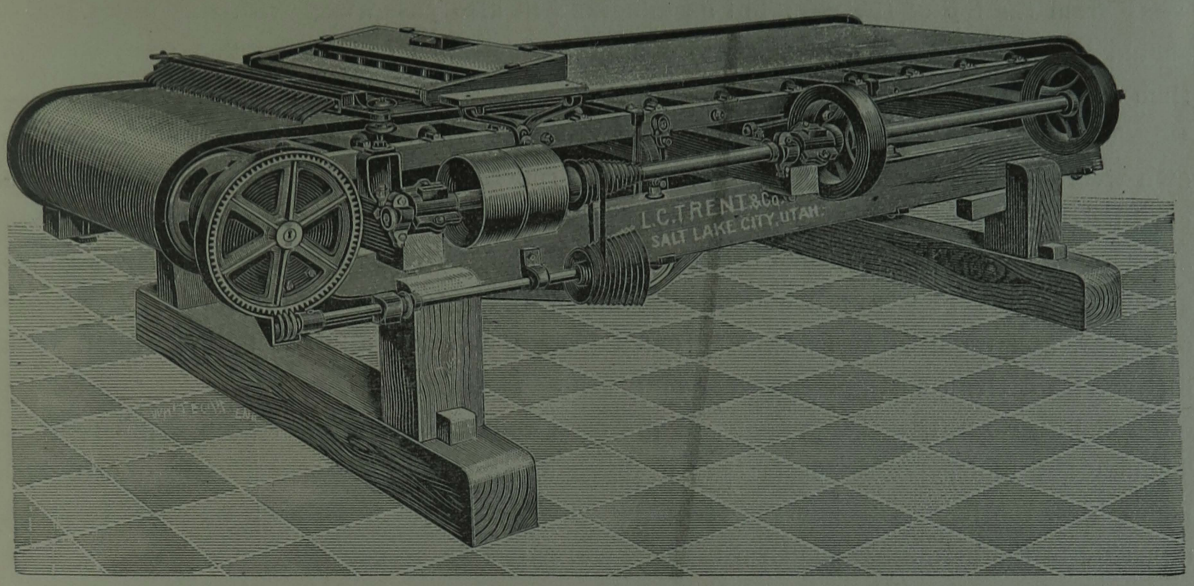


BULLION MOULDS.

Carefully made from close-grained iron, trimmed out and scraped smooth.

LIST.

Length. Inches.	Width. Inches.	Depth. Inches.	Capacity, Ounces. Gold.	Capacity, Ounces. Silver.	Weight. Pounds.	Price.
1	5/8	1/2	4	2	1	$ 30
1 1/2	1	3/4	10	5	1	30
2 1/4	1 1/16	1	25	12	1	30
3 3/8	1 3/8	1 1/8	50	25	3	50
4	2	1 3/4	100	56	7	75
4 1/2	2 1/2	2 1/4	180	100	10	1 00
5 1/8	2 3/4	2 1/4	250	140	10	1 00
5 1/2	2 3/4	2 3/4	300	160	12	1 25



ORE CONCENTRATORS

OR VANNING MACHINES.

METHOD OF WORKING.

The ore is fed with water on the belt, by means of the spreader. Thus the feed is spread uniformly across the belt. A small amount of clear water is distributed by a wooden trough in which is a pipe, or an iron trough with brass spouts.

A depth of three-eighths to one-half inch of sand and water is constantly kept on the table.

The main shaft should be given the proper speed for each kind of ore. We seldom find the ore in one district just the same as in other places, but when the machine is adjusted to the ore, and the best speed is established, this motion should be kept uniform. The best motion will probably be found between one hundred and eighty and two hundred revolutions of the crank shaft per minute, with one-inch throw.

The uphill travel or progressive motion varies from two feet to twelve feet a minute, according to the ore; and the grade or inclination of the table is from three inches to six inches in twelve feet, varying with the ore. The inclination can be changed at will by wedges at the foot of the machine, these wedges being under the lower end and resting on shoulders of uprights, from the main timber of the mill.

The motion, the water used, the grade, and the uphill travel should be regulated for every ore individually; but once established, no further trouble will be experienced in the manipulation.

In treating ore directly from the stamp, too much water may possibly be used by the stamps for proper treatment of the sand by the machine. In such a case there should be a box between the stamps and the concentrator, from which the sand with the proper

amount of water can be drawn from the bottom; and the superfluous water will pass away from the top of the box; but as mineral will also pass away with this water, there should be settling tanks for this water, and the settlings can be worked from time to time as they accumulate.

The main body of the belt suffers hardly any wear at all, since it merely moves its own weight slowly around the freely revolving rollers; and the life of the belt is lengthened by this *precaution*, viz.: To keep it clean from sand at every point except the working surface; thus sand cannot come between the belt and the various rollers. All the bearings should also be kept clean; a machine cleanly worked gives better results and less wear and tear, and requires less power to drive than a machine allowed to be covered with dirt. With a clean machine the wear of bearings is very slight.

The concentration box is kept full of water, and may be of any size or depth desired. Though not indispensable, it is best to have a few jets of water playing above and beneath on the belt as it emerges from the water, so as to wash back any fine material adhering to the belt, and as such a method will cause an overflow, the waste water, being full of finely divided mineral, should be settled carefully in the boxes. Every few hours the concentrations may be scraped out with a hoe into a box, and if this box be on wheels, it can be readily run on a track to the place where the concentrations are stored.

RULES FOR PROPER CONSISTENCY OF PULP.

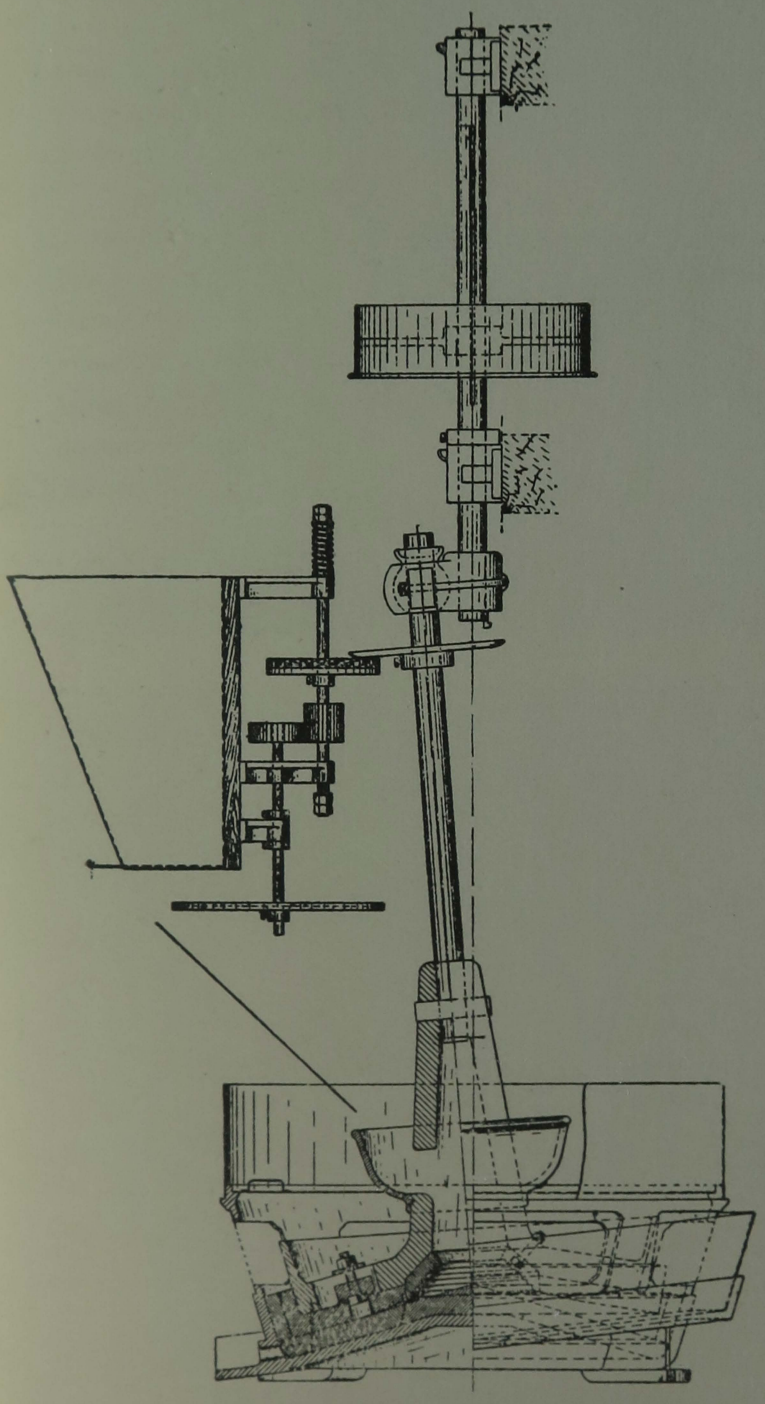
That there is used the proper quantity of water with the pulp from the stamps is very important, and this should be carefully regulated. There should be formed on each side of the belt a *slight corner of sand;* i. e., there should be on each side sand, with less water in it than there is in the balance of the pulp on the belt. If there is not a slight sand corner, the corner will be sloppy, and there will be a *loss. Sloppy corners* are caused by using *too much* water with the pulp from the stamps passing on No. 1.

Frequently, on the other hand, there may not be *enough* water with the pulp from the stamps, and the result will be *too heavy* sand corners. The remedy for this is to use *more* water in the pulp coming on No. 1.

In conclusion, let us state that one most important general direction is to keep the machines clean. No splashing of sand over the sides of the belt must be permitted, and all timber work, as well as metal work, should always be bright and clean. There is no reason why a concentrator should not be kept as clean and in as good condition of wear as a well-run engine, and in good mills this is done. It can be accepted as an axiom that a dirty machine is not doing its duty.

THE KINKEAD MILL

Crushes ore as ore should be crushed, by pinching instead of pounding, and where a thing is done right it is done cheaper, better and more rapidly than in any other way. The thing to be most desired in ore crushing is to deliver valuable matter coarse, and as this material is always softer than the gangue, any attempt to break by pounding results in fine metal and coarse stone.



The Kinkead Mill in its operation pinches the ore as you would crack nuts, and the large screen surface (8 feet) permits mineral to pass out as soon as fine enough. This is not left to mere chance but construction of mill is such that ore must go out when it is crushed to size of screen.

In stamps, if the ore happens to strike battery screen in just the right way at just the right time, it escapes being beaten to a flour, but if all the conditions are not exactly right, the ore is pounded until it will float out on the water, under which circumstances it will float over plates, concentrators, etc., to your tailing pile, and, in a great many instances, does not stop there.

The Kinkead Mill is the result of years of experience in California and Nevada, and is presented to mining men with the following claims:

It is cheap—so cheap that we call it the poor man's mill.

It is more than equal to 5 stamp battery.

Crushes the quartz without *sliming*, because the *shoe never touches the die.*

We use only 2 H.-P. to run mill to full capacity.

We have no cogs, no jar, no pounding, only a steady crushing, no lost motion, no shock, consequently shoes and dies can be worn thinner than ¼ of an inch before removal—an immense saving.

We do not stop mill to clean screens; this can be done inside and out while mill is running.

No deafening noise, no loose nuts or bolts to fall in battery, and break or smash boss or stem.

Cannot be injured by any pieces of steel or hammer-heads coming in through feeder. Simply rides slowly on them till removed.

Its simplicity in application of power. Its durability of construction. Its extremely low horse-power required. Its small space required, only six feet square, ten and one-half feet high.

Its great saving in mill building to cover it. Its simple foudnations, furnished with mill.

Its rapid and uniform crushing, instant discharge. Its large screen surface, over eight square feet. No sliming; crushes hard or soft rock equally well. No shock, no vibration, no noise.

Carries its own automatic self-feeder. Does not amalgamate in battery by loose quicksilver.

Does not flour quicksilver nor grind up amalgam.

You get your gold every day on your plates, inside and outside.

Saves time in stopping your mill to clean up. Saves stopping your mill to clean up screens.

Less wear than any mill known of equal capacity, excepting none.

You can examine inside plates while mill is going, and apply fresh quicksilver when needed; the inside plates are always in sight and touch.

No cogs, no intricate machinery, only two wearing parts; those are shoes and dies—they run for three months or more, according to ore crushed.

Impossible for coarse stuff to touch your inside plates, therefore no scouring of plates.

Being self-contained and occupying small space, easy to stop and start, makes millman's work easy.

Total weight only 2½ tons.

Ease of operation, one man on shift to 100 tons capacity.

Product specially suited for concentration. Crushes uniform size, clean fracture.

Scours rusty or coated gold, so it amalgamates readily.

We will put a line of these mills up to any capacity wanted.

Send for estimates.

If you want to work tailings you can set up your mill, work out the tailing pile; then move on to the next one with your mill; you can take it down and put it up again in 48 hours.

The shoes and dies are only changed once in three to six months, depending on material ground; they run that time on ordinary quartz.

The shoes and dies are made in sections. The whole mill can be made sectional, if required, at small extra cost.

Its present heaviest part is the pan weighing 1455 lbs.; so that any light express wagon can haul the mill.

The shoes and dies are so arranged that wear can be taken up by set bolts in muller, so that they can be worn evenly.

On ordinary quartz, the shoes and dies will last three months or more; the softer the material, the longer the life of the wearing parts.

On some easy working quartz, especially along the mother lode, they would wear from six months to a year or more; just think of saving in time and material by only changing shoes and dies in your mill once in six months.

See the screens. They are above any chance of being forced out or smashed by flying fragments of rock. Nothing touches them until it is ground fine ; cannot reach them until it is ground too fine to injure them.

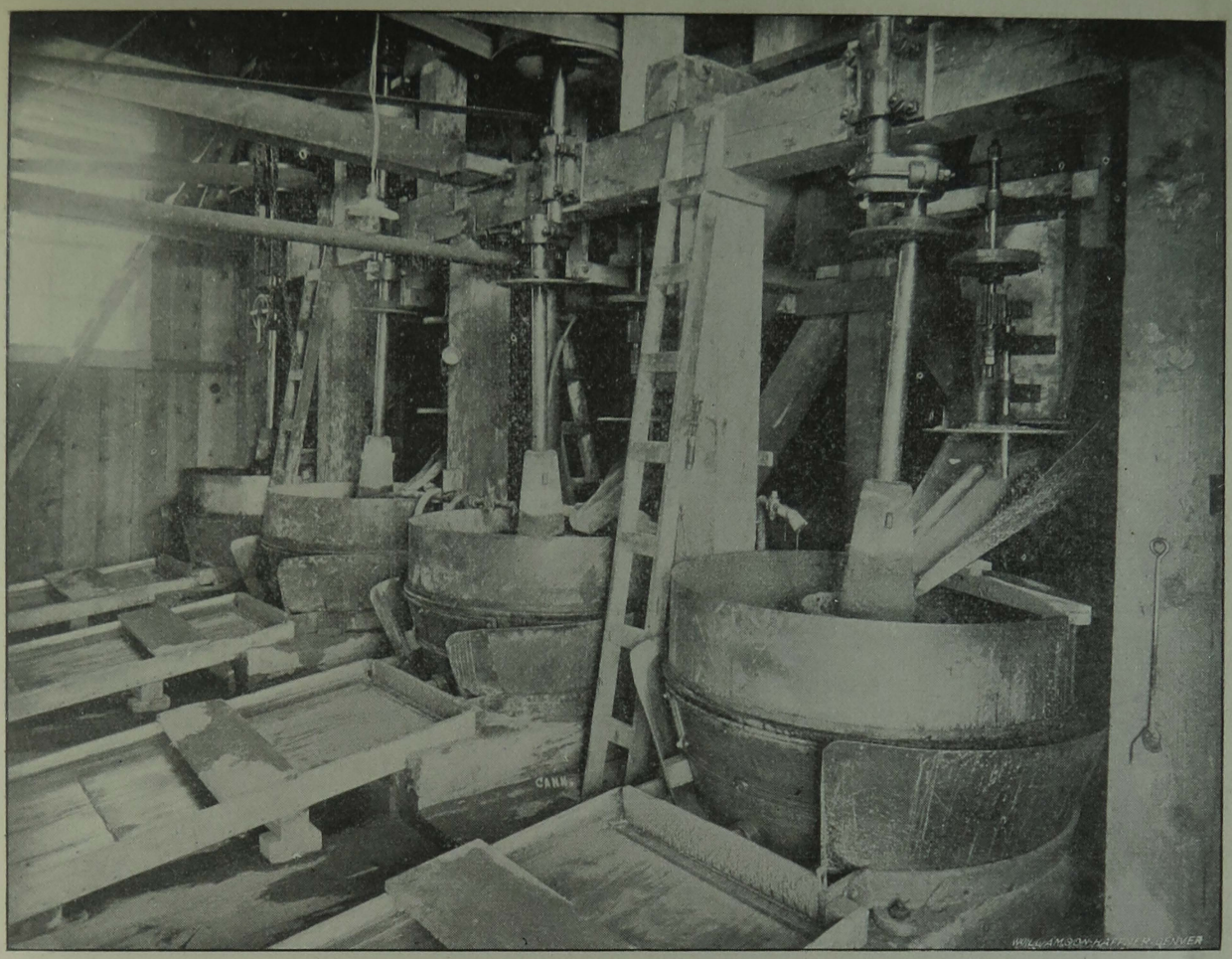
DETAILS OF MILL.

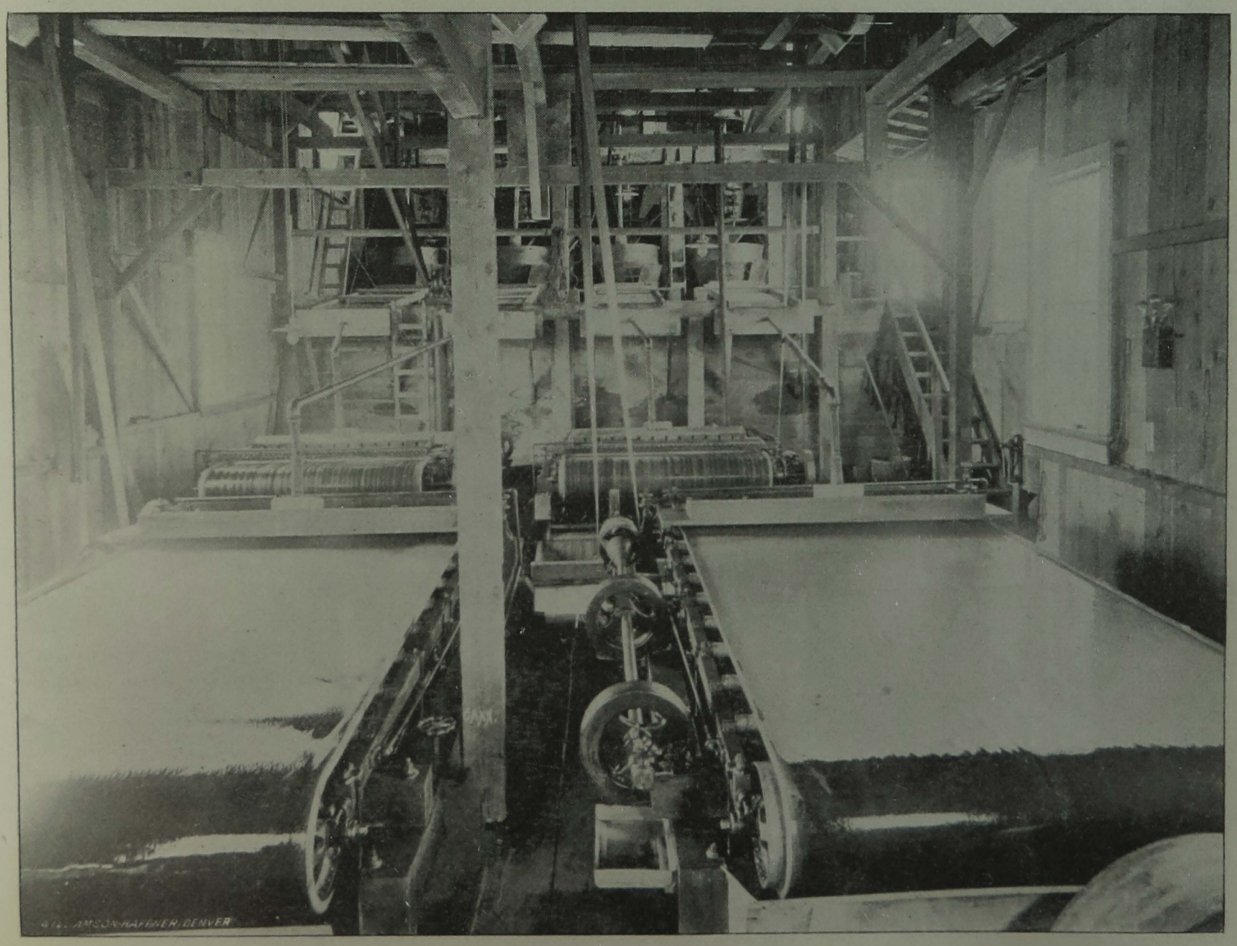
Number of revolutions of mill shaft per minute	120
Number of revolutions of counter shaft per minute	180
Size of pulley on counter shaft	16 inches
Size of pulley on mill shaft	20 inches
Size of belt for driving	5 inches
Size of counter shaft	2½ inches
Size of mill shaft	3 inches
Working distance shoe from die at lowest point	¼ inch
Capacity of mill—24 hours	10 to 15 tons
Amount of horse-power to mill	2
Total actual weight of mill	5165 pounds
Actual weight heaviest piece	1455 pounds
Number of gallons of water for 24 hours, about	4000
Life of set of shoes and dies working on average ore, from	3 to 6 months
Cost of 2 horse-power gas engine to run mill	$250 00
Cost of working engine in San Francisco 24 hours	75 cents

To ascertain cost at mine add freight charges on crude oil for fuel.

Any power can be used to run mill—water, steam or electricity.

The following page shows cuts of mills in operation.





As the condition of location and number of mills to be erected are to be considered, the *purchaser will be furnished with a proper drawing with each mill or number of mills shipped*, showing all necessary details of construction.

MILL FRAME AND FOUNDATION.

As the mill rests on simple mud sills bolted down, these mud sills can be set in any way that may be necessary. The small horse-power required, the lack of any heavy shock or strain, does away with ordinary heavy foundations. Your timbers and foundations are only required to meet a strain of two horse-power to each mlll used.

DETAIL OF WEIGHTS.

Heaviest piece—The pan	1455 pounds.
The muller	1160 pounds.
The shoes	723 pounds.
The dies (side)	238 pounds.
The dies (bottom)	584 pounds.
Upper jaw crusher (on muller)	63 pounds.
Lower jaw crusher (on pan)	97 pounds.
Hopper	96 pounds.
4 screen frames	64 pounds.
Sheet iron covers	70 pounds.
Bolts and nuts	15 pounds.
Driving gear	600 pounds.
Total weight of iron and steel	5165 pounds.

The weight being distributed through a number of parts, renders hauling over trails and roads comparatively simple as compared with ordinary stamp mill machinery.

These heavier parts can be made in sections, if desired, at small extra cost.

The mills can be set up and in working condition in twenty-four hours after delivery at mine, provided that mudsills are set in place ready for mill.

We call attention to our

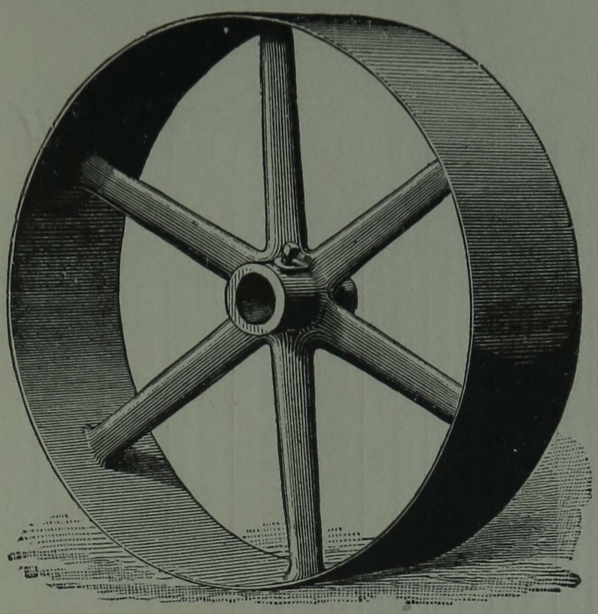
BATTERY AMALGAMATION.

We furnish, if desired, silver plate surface inside of each mill, always in sight. (*Compare this this with an ordinary plate used in a stamp battery.*) This surface is in four separate plates, at regular distances around the inside of the mill, above the dies. It is impossible for anything but fine pulp to touch these plates, therefore they cannot scour.

These plates can be seen and felt at any time, or while the mill is running, to know the condition; any millman will recognize what an advantage this would be.

You do not have to throw in loose quicksilver and guess at it, or have it flour up and create loss or settle amid the shoes and dies, away from contact; but if preferred to amalgamate by feeding quicksilver with ore, will work to better advantage than most stamp mills.

You only put on the plates what is actually necessary for use; these inside plates are only put in mills where inside amalgamation is specially desired; many millmen do not desire them.



CAST IRON PULLEYS.

BORED, TURNED AND BALANCED, WITH SET-SCREWS OR KEY-SEATS.

LIST.

Diam. Inches.	FACE, INCHES.																
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	22
6	$2 15	$2 35	$2 55	$2 80	$3 00	$3 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	2 25	2 50	2 75	3 00	3 25	3 50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	2 50	2 75	3 00	3 25	3 50	3 75	$4 00	$4 25	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	2 55	2 75	3 00	3 25	3 50	3 75	4 00	4 25	$4 50	$5 50	.....	.....	.....	.....	.....	.....	.....
10	2 75	3 00	3 25	3 50	3 75	4 00	4 25	4 75	5 25	5 50	.....	.....	.....	.....	.....	.....	.....
11	2 85	3 10	3 30	3 60	3 90	4 25	4 50	5 00	5 25	5 75	.....	.....	.....	.....	.....	.....	.....
12	3 00	3 25	3 55	4 00	4 25	4 60	5 00	5 50	5 80	6 25	.....	.....	.....	.....	.....	.....	.....
13	3 25	3 50	3 75	4 10	4 50	5 00	5 30	5 75	6 25	6 75	.....	.....	.....	.....	.....	.....	.....
14	3 35	3 65	4 00	4 25	4 75	5 25	5 75	6 25	6 75	7 25	.....	.....	.....	.....	.....	.....	.....
15	3 45	3 85	4 20	4 55	5 00	5 65	6 10	6 70	7 25	7 75	.....	.....	.....	.....	.....	.....	.....
16	3 75	4 10	4 40	4 85	5 45	6 00	6 50	7 25	7 75	8 25	$8 75	$9 25	$9 75	.....	.....	.....	.....
17	3 90	4 30	4 75	5 20	5 75	6 35	6 85	7 80	8 00	8 50	9 00	9 75	10 50	.....	.....	.....	.....
18	4 00	4 45	4 85	5 50	6 00	6 65	7 25	7 90	8 50	9 20	9 75	10 25	10 75	.....	.....	.....	.....
19	4 30	5 00	5 40	6 25	6 75	7 25	7 75	8 50	9 00	9 75	10 25	10 75	11 50	.....	.....	.....	.....
20	4 50	5 25	5 75	6 50	7 00	7 50	8 00	8 75	9 25	10 00	10 75	11 50	12 25	.....	.....	.....	.....
21	4 75	5 50	6 00	6 85	7 50	8 25	9 00	9 75	10 50	11 25	12 00	12 75	13 75	.....	.....	.....	.....
22	5 00	5 75	6 25	7 00	7 75	8 50	9 50	10 50	11 25	12 00	12 75	13 50	14 50	.....	.....	.....	.....
23	5 25	5 85	6 50	7 25	8 00	9 00	9 75	10 50	11 50	2 25	13 00	13 75	14 75	$	.....	.....	.....
24	5 50	6 00	6 75	7 50	8 50	9 50	10 25	11 00	11 75	12 50	13 25	14 25	15 25	16 25	.....	.....	.....
25	6 00	6 50	7 00	7 75	8 50	9 75	11 00	11 75	12 50	13 25	14 00	15 00	16 00	17 00	.....	.....	.....
26	6 50	7 00	7 50	8 25	9 00	10 00	11 50	12 50	13 25	14 25	15 00	15 75	16 50	17 50	.....	.....	.....
27	7 00	7 50	8 00	9 00	10 00	11 00	12 00	13 50	14 25	15 00	15 75	16 50	17 50	18 50	.....	.....	.....
28	7 50	8 00	8 50	9 50	11 50	11 50	12 50	14 25	15 25	16 25	17 00	18 00	19 00	20 00	.....	.....	.....
29	8 50	9 00	9 75	11 00	11 75	12 75	13 75	14 75	15 75	16 75	17 75	19 00	20 00	21 00	.....	.....	.....
30	9 00	9 50	10 50	11 50	12 50	13 50	14 50	15 50	16 50	17 50	18 75	20 00	22 00	23 50	.....	.....	.....
31	.....	10 00	11 00	12 00	13 00	14 00	15 00	16 00	17 00	18 00	19 50	21 00	23 00	24 50	.....	.....	.....
32	.....	10 50	11 25	12 25	13 25	14 50	15 50	16 50	17 50	18 50	20 25	22 00	23 50	25 00	.....	.....	.....

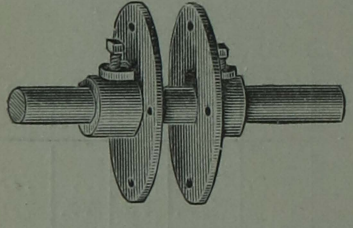
Continued on next page.

PULLEYS---Continued.

Diameter. Inches.	FACE, INCHES.																
	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20	22	24
33	$11 00	$11 75	$12 75	$13 75	$15 00	$16 25	$17 50	$18 50	$19 50	$21 50	$23 25	$25 50	$27 00	.....	.....	.....	.....
34	11 25	12 00	13 00	14 25	15 50	16 75	18 00	19 20	20 50	22 50	24 25	26 50	28 50	.....	.....	.....	.....
35	11 75	12 50	13 50	14 75	16 00	17 25	18 50	20 00	21 50	23 50	25 00	27 50	29 50	.....	.....	.....	.....
36	12 00	12 75	13 75	15 00	16 25	17 50	19 00	20 50	22 00	24 00	25 75	28 00	30 25	$35 25	$40 75	.....	.....
38	13 00	14 50	15 50	17 00	18 25	20 00	21 50	23 00	24 75	27 00	29 25	31 50	33 50	37 50	42 00	.....	.....
40	.....	.....	17 00	18 00	19 25	21 00	22 50	25 25	27 00	29 25	31 75	33 50	35 25	39 50	43 50	$48 00	$54 00
42	.....	.....	18 00	19 50	21 00	22 75	24 50	26 50	28 75	31 25	33 50	36 50	39 50	44 00	48 50	54 50	60 00
44	.....	.....	19 00	21 00	22 25	24 50	26 50	28 75	31 00	33 75	35 75	38 25	40 75	45 75	51 00	57 00	63 00
46	.....	.....	20 00	21 75	23 25	25 75	28 00	30 50	33 25	36 25	39 00	42 25	45 25	50 00	55 00	63 00	70 00
48	.....	.....	21 00	23 00	24 75	27 50	30 00	33 00	35 75	38 50	42 00	44 00	46 75	52 25	60 00	70 00	80 00
50	.....	.....	23 00	25 00	27 00	29 50	32 50	35 25	38 00	41 75	45 00	48 50	52 00	58 50	65 00	75 00	85 00
52	.....	.....	25 00	28 00	30 50	33 00	35 00	37 50	40 00	43 50	47 00	51 00	54 00	62 00	71 50	80 00	90 00
54	.....	.....	27 00	31 00	34 00	36 00	38 00	41 00	43 00	46 50	51 50	54 50	57 50	68 00	77 50	86 50	95 00
56	.....	.....	29 00	33 00	36 50	38 50	40 00	43 00	46 00	50 00	54 00	57 50	61 00	70 00	80 00	90 00	100 00
58	.....	.....	31 00	35 00	38 50	40 50	42 50	46 50	50 00	54 00	58 00	62 00	66 00	75 00	85 00	96 00	106 00
60	.....	.....	33 00	36 50	40 00	43 00	46 00	50 00	54 00	59 00	63 00	68 00	72 00	80 00	90 00	102 00	112 00
62	.....	.....	35 00	39 00	42 00	44 50	48 00	52 00	56 00	61 00	65 00	70 00	75 00	85 00	95 00	105 00	115 00
64	.....	.....	37 00	41 00	44 00	47 50	50 00	54 50	58 50	64 00	68 50	74 00	79 00	89 00	100 00	110 00	120 00
66	.....	.....	39 00	43 00	47 00	51 00	54 00	59 00	62 50	68 00	73 00	78 00	83 00	93 00	105 00	115 00	128 00
68	.....	.....	41 00	45 50	49 50	53 50	57 00	62 00	65 50	71 00	76 00	81 50	86 50	97 00	110 00	120 00	134 00
70	.....	.....	43 00	47 50	52 00	56 00	60 00	65 00	69 50	75 00	80 00	85 50	90 50	101 00	114 00	125 00	140 00
72	.....	.....	45 00	50 00	54 00	59 00	64 00	69 00	73 50	79 00	84 00	89 50	94 50	106 50	118 00	130 00	147 00
78	.....	.....	.....		.....	.....	77 50	.....	87 50	.....	97 50	.....	107 50	118 50	129 00	141 00	155 00
84	.....	.....	.....	.....	.....	.....	91 00	.....	100 00	.....	110 00	.....	120 00	130 00	140 00	150 00	160 00
90	.....	.....	.....		.....	.....	106 00	.....	117 00	.....	127 00	.....	137 00	147 00	157 00	167 00	177 00
96	.....	.....	.....	.....	.....	.....	125 00	.....	135 00	.....	145 00	.....	155 00	165 00	175 00	185 00	195 00
100	.....	.....	.....	.....	.....	.....	135 00	.....	145 00	.....	155 00	.....	166 00	176 00	186 00	196 00	206 00

PULLEY FLANGES.

BORED, SET-SCREWED OR KEY-SEATED.



LIST.

Diameter ..... Inches	4	6	8	10	12
Price ..... Each	$2 00	$2 25	$2 50	$2 75	$3 00
Diameter ..... Inches	14	16	18	20	24
Price ..... Each	$3 50	$4 00	$4 50	$5 00	$6 50

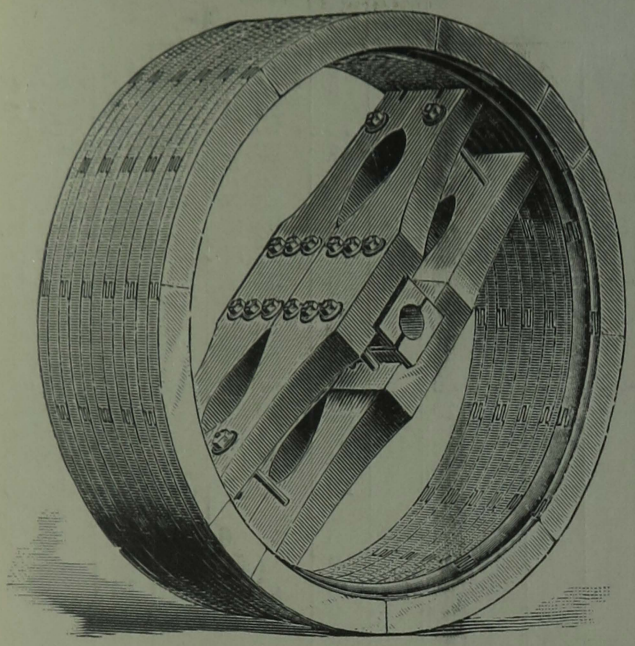
CAST IRON PULLEYS.

In ordering Pulleys always specify whether *crowning* or *straight* face; also, whether *set-screwed* or *key-seated.* If possible always send a wire the exact size of the shafting. For a shifting belt the Pulley should be turned straight on the face, and for a non-shifting belt it should be turned with a crowning face. For tight and loose Pulleys the face of each should be crowning.

ADD TO LIST OF PLAIN PULLEYS.

	6 to 12 Inches Diameter. Per Cent.	12½ to 24 Inches Diameter. Per Cent.	25 to 36 Inches Diameter. Per Cent.	37 to 48 Inches Diameter. Per Cent.	50 Inch. Diam. and larger. Per Cent.
For Split Pulleys	40	30	20	15	10
For Clamp Pulleys	25	20	12½	10	5
For Tight and Loose Pulleys	15	10	5	5	5
For Pulleys with Flange in Center	35	35	35	30	30
For Pulleys with Flange in one Edge	60	60	60	60	60
For Pulleys with Flange on both Edges	100	100	100	100	100
Double Arms	50	40	30	25	25

WOOD SPLIT PULLEYS.



SMALL SIZES - LIST.

Diameter. Inches.	FACE, INCHES.						
	2	3	4	5	6	7	8
3	$2 00	$2 20	$2 40	$2 60	$2 80	$3 00	$3 25
4	2 00	2 25	2 50	2 75	3 00	3 25	3 60
5	2 10	2 35	2 65	3 00	3 25	3 60	3 85
6	2 20	2 50	2 85	3 20	3 55	3 90	4 25
7	2 30	2 60	2 90	3 30	3 70	4 20	4 70
8	2 40	2 70	3 00	3 45	3 90	4 40	4 95

Diameter. Inches.	FACE, INCHES.						
	9	10	11	12	13	14	
3	$3 50	$3 75	$4 00	$4 35	$4 70	$5 00	.....
4	3 90	4 25	4 50	4 80	5 10	5 50	.....
5	4 15	4 40	4 70	5 10	5 50	6 00	....
6	4 45	5 00	5 50	6 00	6 50	7 00	.....
7	5 25	5 75	6 25	6 60	7 20	7 75	.....
8	5 50	6 00	6 60	7 25	7 75	8 30	.....

LARGE SIZES—LIST.

Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.
9	3	$ 2 50	13	4	$ 3 10	16	4	$ 3 65	18	13	$ 8 50	20	18	$ 14 70	23	7	$ 7 70
	4	2 65		5	3 40		5	4 05		14	9 00					8	8 40
	5	2 90		6	3 75		6	4 60		15	9 80	21	4	4 70		9	9 20
	6	3 15		7	4 00		7	5 05		16	10 70		5	5 60		10	9 95
	7	3 28		8	4 25		8	5 50		17	11 75		6	6 40		11	11 05
	8	3 40		9	4 53		9	5 90		18	13 00		7	6 95		12	12 00
				10	4 80		10	6 30					8	7 50		13	13 00
10	3	2 60		11	5 20		11	6 65	19	4	4 25		9	8 10		14	14 00
	4	2 75		12	5 60		12	7 00		5	4 80		10	8 65		15	15 10
	5	3 00					13	7 35		6	5 50		11	9 55		16	16 20
	6	3 25	14	3	3 00		14	7 70		7	6 13		12	10 40		17	17 00
	7	3 40		4	3 25		15	8 35		8	6 75		13	11 20		18	18 50
	8	3 55		5	3 65					9	7 15		14	12 00			
	9	3 72		6	4 10	17	3	3 50		10	7 50		15	12 85	24	4	5 40
	10	3 90		7	4 40		4	3 85		11	8 05		16	13 70		5	6 35
				8	4 70		5	4 25		12	8 60		17	14 70		6	7 30
11	3	2 70		9	5 02		6	4 85		13	9 20		18	15 80		7	8 05
	4	2 85		10	5 35		7	5 35		14	9 80					8	8 80
	5	3 10		11	5 68		8	5 85		15	10 70	22	4	4 95		9	9 65
	6	3 35		12	6 00		9	6 30		16	11 70		5	5 90		10	10 45
	7	3 53		13	6 30		10	6 70		17	12 75		6	6 85		11	11 55
	8	3 70		14	6 60		11	7 10		18	13 80		7	7 45		12	12 70
	9	3 90					12	7 50					8	8 00		13	13 90
	10	4 10	15	3	3 10		13	7 88	20	4	4 45		9	8 70		14	15 10
				4	3 45		14	8 25		5	5 20		10	9 40		15	16 30
12	3	2 80		5	3 85		15	9 05		6	6 00		11	10 30		16	17 50
	4	2 95		6	4 35					7	6 60		12	11 20		17	18 75
	5	3 20		7	4 75	18	3	3 70		8	7 15		13	12 10		18	20 00
	6	3 55		8	5 10		4	4 05		9	7 60		14	13 00		20	28 50
	7	3 70		9	5 48		5	4 55		10	8 00		15	13 60		21	30 50
	8	3 85		10	5 85		6	5 10		11	8 75		16	14 20		22	32 50
	9	4 08		11	6 18		7	5 65		12	9 52		17	15 60		23	35 00
	10	4 30		12	6 50		8	6 20		13	10 25		18	17 00		24	37 50
	11	4 70		13	6 85		9	6 65		14	11 00					25	41 00
	12	5 10		14	7 20		10	7 10		15	11 80	23	4	5 20			
							11	7 55		16	12 60		5	6 15	25	4	5 80
13	3	2 90	16	3	3 30		12	8 00		17	13 60		6	7 05		5	6 65

Continued on next page.

WOOD SPLIT PULLEYS---Continued.

Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.
25	6	$ 7 60	28	6	$ 8 60	31	6	$ 9 85	34	6	$ 11 50	38	8	$ 17 60	44	14	$ 36 00
	7	8 40		7	9 45		7	11 02		7	13 00		9	19 15		15	38 40
	8	9 20		8	10 30		8	12 20		8	14 50		10	20 70		16	40 75
	9	9 85		9	11 20		9	13 17		9	15 75		11	22 70		17	43 35
	10	10 90		10	12 10		10	14 13		10	17 00		12	24 75		18	46 00
	11	12 15		11	13 70		11	15 68		11	18 50		13	26 60		20	54 00
	12	13 40		12	15 25		12	17 20		12	20 00		14	28 50		21	56 50
	13	14 80		13	17 10		13	19 52		13	22 50		15	31 50		22	59 00
	14	16 25		14	19 00		14	21 87		14	24 50		16	34 50		23	62 00
	15	17 70		15	21 00		15	24 22		15	27 25		17	36 90		24	67 00
	16	19 10		16	23 00		16	26 57		16	30 00		18	39 25		25	73 00
	17	20 55		17	24 95		17	28 85		17	32 25		20	45 00			
	18	22 00		18	26 90		18	31 12		18	34 50		21	47 00	46	6	22 00
	20	30 00		20	33 00		20	35 37		20	38 75		22	49 00		7	24 00
	21	32 00		21	35 00		21	37 25		21	40 75		23	51 50		8	26 00
	22	34 00		22	37 00		22	39 25		22	42 75		24	54 00		9	28 00
	23	36 50		23	39 00		23	41 25		23	44 75		25	58 00		10	30 00
	24	39 00		24	41 50		24	43 25		24	46 75					11	31 75
	25	42 50		25	44 50		25	46 00		25	49 00	40	6	16 00		12	33 50
													7	17 50		13	36 00
26	4	6 35	29	4	7 60	32	4	8 80	35	4	10 10		8	19 00		14	38 50
	5	7 00		5	8 20		5	9 40		5	11 20		9	20 75		15	40 75
	6	7 95		6	9 00		6	10 30		6	12 25		10	22 50		16	43 00
	7	8 80		7	9 95		7	11 60		7	13 75		11	24 65		17	45 50
	8	9 60		8	10 90		8	12 90		8	15 25		12	26 75		18	48 00
	9	10 05		9	11 80		9	13 95		9	16 65		13	28 85		20	58 00
	10	11 40		10	12 67		10	15 00		10	18 05		14	31 00		21	61 00
	11	12 80		11	14 20		11	16 45		11	19 62		15	33 65		22	64 00
	12	14 20		12	15 87		12	17 90		12	21 25		16	36 25		23	68 00
	13	15 85		13	17 92		13	20 30		13	23 50		17	38 85		24	72 00
	14	17 50		14	20 00		14	22 75		14	25 50		18	41 50		25	78 00
	15	19 15		15	22 10		15	25 25		15	28 35		20	48 00			
	16	20 80		16	24 20		16	27 75		16	31 20		21	50 50	48	6	24 50
	17	22 45		17	26 32		17	30 00		17	33 47		22	52 50		7	26 25
	18	24 10		18	28 45		18	32 25		18	35 75		23	55 00		8	28 00
	20	31 50		20	33 75		20	36 25		20	40 12		24	58 00		9	30 50
	21	33 50		21	35 62		21	38 25		21	42 12		25	63 00		10	32 50
	22	35 50		22	37 62		22	40 25		22	44 12					11	34 25
	23	37 50		23	39 62		23	42 25		23	46 12	42	6	17 50		12	36 00
	24	40 00		24	41 87		24	44 25		24	48 12		7	19 50		13	38 50
	25	43 50		25	45 00		25	46 50		25	51 00		8	21 50		14	41 00
													9	23 25		15	43 00
27	4	6 78	30	4	8 00	33	4	9 20	36	4	10 60		10	25 00		16	45 00
	5	7 40		5	8 60		5	9 95		5	11 90		11	27 00		17	47 50
	6	8 27		6	9 40		6	10 90		6	13 00		12	29 00		18	50 00
	7	9 13		7	10 45		7	12 30		7	14 50		13	31 25		20	62 00
	8	9 95		8	11 50		8	13 70		8	16 00		14	33 50		21	66 75
	9	10 63		9	12 40		9	14 85		9	17 55		15	36 00		22	71 50
	10	11 75		10	13 25		10	16 00		10	19 10		16	38 50		23	76 00
	11	13 25		11	14 90		11	17 47		11	20 80		17	41 10		24	80 00
	12	14 72		12	16 50		12	18 95		12	22 50		18	43 75		25	84 00
	13	16 47		13	18 75		13	21 45		13	24 50		20	51 00			
	14	18 25		14	21 00		14	23 62		14	26 50		21	53 50	50	8	31 50
	15	20 17		15	23 20		15	26 25		15	29 45		22	56 00		9	33 50
	16	21 90		16	25 40		16	28 87		16	32 40		23	59 00		10	35 50
	17	23 70		17	27 70		17	31 12		17	34 70		24	63 00		11	37 25
	18	25 50		18	30 00		18	33 37		18	37 00		25	68 00		12	39 00
	20	32 25		20	34 50		20	37 00		20	41 50					13	41 50
	21	34 25		21	36 25		21	39 50		21	43 50	44	6	19 50		14	44 00
	22	36 25		22	38 25		22	41 50		22	45 50		7	21 65		15	47 00
	23	38 25		23	40 25		23	43 50		23	47 50		8	23 75		16	50 00
	24	40 75		24	42 25		24	45 50		24	49 50		9	25 65		17	53 00
	25	44 00		25	45 50		25	47 75		25	53 00		10	27 50		18	56 00
													11	29 50		20	65 00
28	4	7 20	31	4	8 40	34	4	9 60	38	6	14 50		12	31 50		21	69 75
	5	7 80		5	9 00		5	10 50		7	16 05		13	33 75		22	74 50

Continued on next page.

WOOD SPLIT PULLEYS---Continued.

Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.	Diam. Inches.	Face. Inches.	Price.
50	23	$ 79 50	56	12	$ 48 50	60	21	$ 96 00	78	18	$124 00	96	20	$192 00	108	36	$476 00
	24	85 50		13	51 00		22	101 00		20	134 00		21	202 00		38	500 00
	25	90 00		14	53 50		23	106 00		21	140 00		22	212 00		40	525 00
				15	56 75		24	111 00		22	146 00		23	224 00			
52	8	34 00		16	60 00		25	116 00		23	156 00		24	237 00			
	9	36 00		17	63 75					24	168 00		25	250 00	114	8	159 00
	10	38 00		18	69 50	66	10	57 00		25	180 00					9	170 00
	11	40 00		20	84 00		11	60 00				102	8	130 00		10	182 00
	12	42 00		21	88 50		12	63 50	84	12	110 00		9	140 00		11	193 00
	13	44 00		22	93 25		13	67 50		13	114 00		10	150 00		12	205 00
	14	46 00		23	98 00		14	71 50		14	119 00		11	160 00		14	228 00
	15	49 50		24	102 50		15	75 50		15	124 00		12	171 00		16	252 00
	16	52 50		25	106 00		16	80 00		16	129 00		14	192 00		18	277 00
	17	56 50					17	84 50		17	134 00		16	213 00		20	303 00
	18	60 00	58	8	43 50		18	89 00		18	139 00		18	233 00		22	329 00
	20	68 80		9	46 00		20	103 00		20	154 00		20	256 00		24	356 00
	21	72 50		10	47 50		21	109 00		21	162 00		22	279 00		26	382 00
	22	77 00		11	50 00		22	115 00		22	170 00		24	302 00		28	408 00
	23	81 50		12	52 25		23	122 50		23	181 00		26	324 00		30	435 00
	24	86 25		13	55 00		24	130 00		24	193 00		28	347 00		32	462 00
	25	93 00		14	57 75		25	137 50		25	205 00		30	370 00		34	488 00
				15	61 00								32	394 00		36	515 00
54	8	37 50		16	64 25	72	10	64 00					34	417 00		38	541 00
	9	39 25		17	68 50		11	67 50	90	12	125 00		36	440 00		40	568 00
	10	41 00		18	73 75		12	71 50		13	129 00		38	463 00			
	11	43 00		20	87 50		13	75 50		14	134 00		40	486 00	120	8	172 00
	12	45 00		21	90 50		14	80 00		15	139 00					9	184 00
	13	47 25		22	95 25		15	85 00		16	144 00					10	196 00
	14	49 50		23	100 00		16	90 00		17	149 00	108	8	144 00		11	208 00
	15	52 50		24	104 50		17	95 00		18	154 00		9	154 00		12	221 00
	16	55 50		25	110 00		18	100 00		20	174 00		10	165 00		14	246 00
	17	60 00					20	115 00		21	183 00		11	176 00		16	271 00
	18	64 50	60	8	47 00		21	127 00		22	192 00		12	187 00		18	298 00
	20	73 50		9	49 25		22	131 00		23	204 00		14	209 00		20	325 00
	21	78 25		10	51 50		23	136 00		24	217 00		16	232 00		22	353 00
	22	83 00		11	53 75		24	145 00		25	230 00		18	256 00		24	382 00
	23	87 75		12	56 00		25	155 00					20	280 00		26	410 00
	24	92 50		13	59 00				96	12	140 00		22	304 00		28	439 00
	25	98 00		14	62 00	78	12	95 00		13	145 00		24	329 00		30	467 00
				15	65 25		13	99 00		14	150 00		26	353 00		32	495 00
56	8	40 50		16	68 50		14	104 00		15	155 00		28	377 00		34	524 00
	9	42 50		17	73 25		15	109 00		16	160 00		30	402 00		36	552 00
	10	44 50		18	78 00		16	114 00		17	165 00		32	427 00		38	581 00
	11	46 50		20	91 00		17	119 00		18	170 00		34	451 00		40	609 00

From any diameter up we increase size by any part of an inch in diameter or width of face, and make any size up to twenty feet diameter.

EXTRA BUSHINGS FOR WOOD SPLIT PULLEYS.

LIST.

Length of bushing.....Inches	6 to 8	10 to 12	14 to 16
3-inch outside diameter.....Each	$ 0 25	$ 0 30	$ 0 35
3½-inch outside diameter.....Each	30	35	40

IRON SLEEVES FOR LOOSE PULLEYS.

LIST.

Face of pulley.....Inches	3	3	3	3	4	4	4	4	5	5	5
Bore.....Inches	1 3/16	1 7/16	1 11/16	1 15/16	1 3/16	1 7/16	1 11/16	1 15/16	1 3/16	1 7/16	1 11/16
Price.....Each	$ 0 55	$ 0 60	$ 0 65	$ 0 70	$ 0 65	$ 0 70	$ 0 75	$ 0 80	$ 0 75	$ 0 80	$ 0 85
Face of pulley.....Inches	5	5	6	6	6	6	8	8	8	8	
Bore.....Inches	1 5/16	2 3/16	1 7/16	1 11/16	1 15/16	2 3/16	1 7/16	1 11/16	1 15/16	2 3/16	
Price.....Each	$ 0 95	$ 1 05	$ 0 90	$ 1 00	$ 1 10	$ 1 25	$ 1 15	$ 1 25	$ 1 40	$ 1 60	

Above prices are for iron sleeves two inches longer than the face of pulley, and are net, not subject to discount.

SHAFTING.

COLD DIE-ROLLED STEEL AND IRON SHAFTING.

ROUNDS.

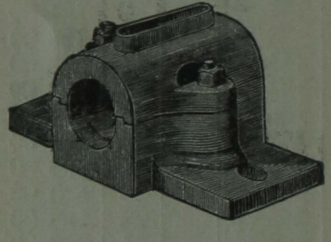
Polished and Made to U. S. Standard Gauge.

LIST.

Diameter. Inches.	Weight Per Foot. Pounds.	Price Per Pound Cents.	Diameter. Inches.	Weight Per Foot. Pounds.	Price Per Pound Cents.	Diameter. Inches.	Weight Per Foot. Pounds.	Price Per Pound. Cents.	Diameter. Inches.	Weight Per Foot. Pounds.	Price Per Pound. Cents.	Diameter. Inches.	Weight Per Foot. Pounds.	Price Per Pound. Cents.	Diameter. Inches.	Weight Per Foot. Pounds.	Price Per Pound. Cents.
1/4	.167	13	15/16	2.34	6½	1 5/8	7.04		2 5/16	14.00		3	24.06	5	3 1/16	36.40	
5/16	.259	11	1	2.64		1 1/16	7.60		2 3/8	15.07		3 1/16	24 58		3 3/4	37.45	
3/8	.370		1 1/16	3 00		1 3/4	8.16		2 7/16	15.83		3 1/8	26.09		3 7/8	39.85	
7/16	.510	9	1 1/8	3.33		1 13/16	8.78		2 1/2	16.68		3 3/16	27.16		3 15/16	41.04	6
1/2	.666		1 3/16	3.74	5½	1 7/8	9.39		2 9/16	17.55		3 1/4	28.24	5½	4	42.50	
9/16	.843		1 1/4	4.16		1 15/16	10 00	5	2 5/8	18.32	5	3 5/16	29.40		4 1/4	48.26	
5/8	1.05	7¾	1 5/16	4.61		2	10.65		2 11/16	19.31		3 3/8	30.43		4 7/16	52.62	
11/16	1.25		1 3/8	5.048		2 1/16	11.15		2 3/4	20.18		3 7/16	31 50		4 1/2	54.11	
3/4	1.50		1 7/16	5.50		2 1/8	12 07		2 13/16	21.15		3 1/2	32 64		4 3/4	60.88	
13/16	1.757	6½	1 1/2	6.00	5	2 3/16	12.79		2 7/8	22.09		3 9/16	33.84	6	4 15/16	65.50	6½
7/8	2.03		1 9/16	6.52		2 1/4	13.49		2 15/16	22.96		3 5/8	35.20		5	67.50	

Our Shafting is finished to gauge. All shafts 4 5/16 inches diameter and over of hammered iron.

RIGID JOURNAL BOXES. SPECIAL.

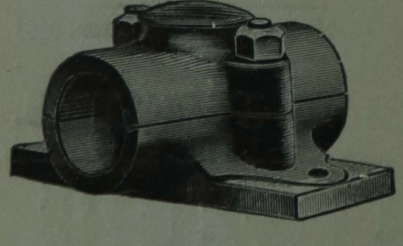


LIST.

Size of Shaft. Inches.	Length of Box. Inches.	Price per Box.	Size of Shaft. Inches.	Length of Box. Inches.	Price per Box.
1 3/16	4	$ 1 50	2 15/16	6	$ 5 00
1 7/16	4	1 75	3 3/16	6	5 75
1 11/16	4½	2 25	3 7/16	7	6 75
1 15/16	4½	2 50	3 11/16	8	7 25
2 3/16	5	3 00	3 15/16	8	8 00
2 7/16	5	3 75	.....	.....	.....
2 11/16	5	4 25	.....	...	.....

RIGID JOURNAL BOXES. STANDARD.

Length of Bearing Three Times Diameter of Shaft.

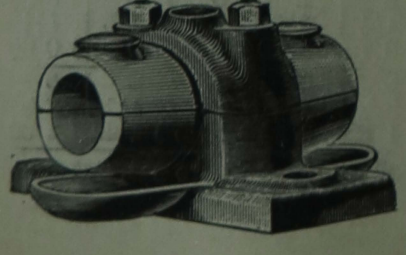


LIST.

Size. Inches.	Price.	Size. Inches.	Price.	Size. Inches.	Price.
1 3/16	$ 1 60	2 7/16	$ 4 60	3 11/16	$10 10
1 7/16	2 00	2 11/16	5 50	3 15/16	11 50
1 11/16	2 50	2 15/16	6 50	4 7/16	15 00
1 15/16	3 10	3 3/16	7 60	4 15/16	19 00
2 3/16	3 80	3 7/16	8 80	5 7/16	23 50

BALL AND SOCKET JOURNAL BOXES.

Length of Bearing Four Times Diameter of Shaft.

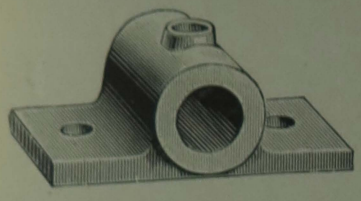


LIST.

Size. Inches.	Price.	Size. Inches.	Price.	Size. Inches.	Price.
1 7/16	$ 5 10	2 11/16	$11 00	3 15/16	$27 10
1 11/16	5 50	2 15/16	13 50	4 7/16	36 30
1 15/16	6 30	3 3/16	16 30	4 15/16	47 10
2 3/16	7 50	3 7/16	19 50	5 7/16	59 50
2 7/16	9 60	3 11/16	23 10	5 15/16	73 50

SOLID JOURNAL BOXES.

BABBITTED OR BORED.



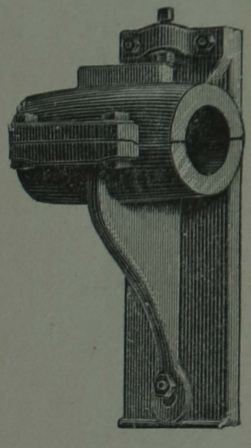
LIST.

Diameter of Shaft .....Inches	$1\frac{3}{16}$	$1\frac{7}{16}$	$1\frac{11}{16}$	$1\frac{15}{16}$
Price ..... Each	$ 1 20	$ 1 35	$ 1 90	$ 2 25
Diameter of Shaft .....Inches	$2\frac{3}{16}$	$2\frac{7}{16}$	$2\frac{11}{16}$	$2\frac{15}{16}$
Price .....Each	$ 2 70	$ 3 40	$ 4 10	$ 4 75

RIGID POST BOXES.

LIST.

Diameter of Shaft. Inches.	Length of Bearing. Inches.	Price per Box.	Diameter of Shaft. Inches.	Length of Bearing. Inches.	Price per Box.
$1\frac{3}{16}$	$3\frac{3}{4}$	$2 00	$2\frac{11}{16}$	$8\frac{1}{4}$	$6 50
$1\frac{7}{16}$	$4\frac{1}{2}$	2 25	$2\frac{15}{16}$	9	7 50
$1\frac{11}{16}$	$5\frac{1}{4}$	3 25	$3\frac{3}{16}$	$9\frac{3}{4}$	8 50
$1\frac{15}{16}$	6	4 25	$3\frac{7}{16}$	$10\frac{1}{2}$	9 75
$2\frac{3}{16}$	$6\frac{3}{4}$	4 75	$3\frac{11}{16}$	$11\frac{1}{4}$	10 75
$2\frac{7}{16}$	$7\frac{1}{2}$	5 75	$3\frac{15}{16}$	12	12 00

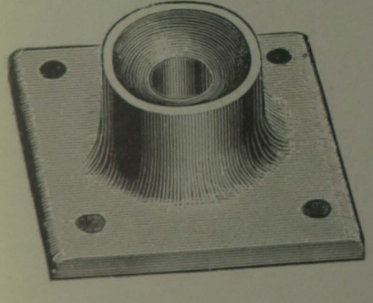


ADJUSTABLE POST BOXES.

LIST.

Size. Inches.	Price.	Size. Inches.	Price.	Size. Inches.	Price.
$1\frac{3}{16}$—$1\frac{1}{4}$	$4 50	$2\frac{7}{16}$ - $2\frac{1}{2}$	$8 90	$3\frac{11}{16}$—$3\frac{3}{4}$	$23 00
$1\frac{7}{16}$—$1\frac{1}{2}$	4 80	$2\frac{11}{16}$—$2\frac{3}{4}$	10 90	$3\frac{15}{16}$—4	27 00
$1\frac{11}{16}$—$1\frac{3}{4}$	5 20	$2\frac{15}{16}$—3	13 30	$4\frac{7}{16}$—$4\frac{1}{2}$	36 30
$1\frac{15}{16}$—2	6 00	$3\frac{3}{16}$—$3\frac{1}{4}$	16 20	$4\frac{15}{16}$—5	47 10
$2\frac{3}{16}$—$2\frac{1}{4}$	7 30	$3\frac{7}{16}$—$3\frac{1}{2}$	19 40	.....	.....

STEP BOXES.



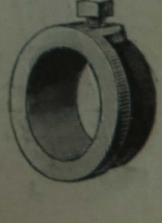
LIST.

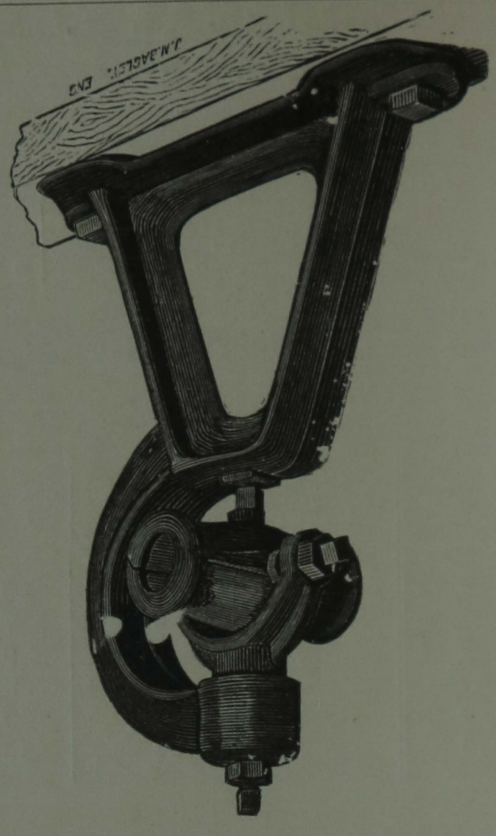
Size. Inches.	Steel Plate and Babbitt.	Size. Inches.	Steel Plate and Babbitt.
$1\frac{3}{16}$	$3 00	$2\frac{7}{16}$	$4 50
$1\frac{7}{16}$	3 50	$2\frac{15}{16}$	5 50
$1\frac{11}{16}$	3 75	$3\frac{7}{16}$	6 00
$1\frac{15}{16}$	4 00	$3\frac{15}{16}$	7 50
$2\frac{3}{16}$	4 15	...	.....

SET COLLARS, WITH STEEL SET SCREWS.

LIST.

Size. Inches.	Price.	Size. Inches.	Price.	Size. Inches.	Price.	Size. Inches.	Price.	Size. Inches.	Price.
$1\frac{5}{16}$	$ 80	$1\frac{1}{2}$	$1 10	$2\frac{7}{16}$	$1 80	$3\frac{7}{16}$	$2 75	$4\frac{15}{16}$	$5 00
$1\frac{3}{16}$	80	$1\frac{11}{16}$	1 20	$2\frac{11}{16}$	2 00	$3\frac{11}{16}$	3 00	$5\frac{7}{16}$	6 00
$1\frac{1}{4}$	90	$1\frac{15}{16}$	1 40	$2\frac{15}{16}$	2 25	$3\frac{15}{16}$	3 50	$5\frac{15}{16}$	7 50
$1\frac{7}{16}$	1 00	$2\frac{3}{16}$	1 60	$3\frac{3}{16}$	2 50	$4\frac{7}{16}$	4 00	$6\frac{7}{16}$	9 00





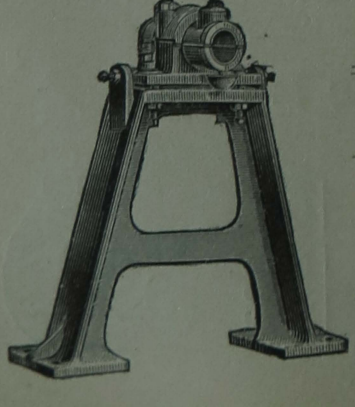
SELF-ADJUSTING DROP HANGERS.

BABBITTED.

LIST.

SIZE OF SHAFT.	12-Inch Drop.	14-Inch Drop.	17-Inch Drop.	20-Inch Drop.	24-Inch Drop.	30-Inch Drop.
$1\frac{3}{16}$	$ 5 25	$ 5 50	$ 5 85	$ 6 45	$ 6 95	.....
$1\frac{7}{16}$	5 50	5 70	6 00	6 65	7 50	.....
$1\frac{11}{16}$	5 95	6 20	6 30	6 85	7 95	.....
$1\frac{15}{16}$	7 00	7 25	7 60	7 90	8 40	.....
$2\frac{3}{16}$	8 00	8 25	9 35	9 60	10 15	.....
$2\frac{7}{16}$	10 00	10 20	10 50	10 95	11 30	..
$2\frac{11}{16}$	10 80	11 15	11 65	12 55	13 45	$16 45
$2\frac{15}{16}$	.....	15 65	16 90	17 45	17 95	20 65
$3\frac{3}{16}$	. ....	16 25	18 20	19 30	20 45	23 50
$3\frac{7}{16}$	.....	22 60	23 50	25 00	27 00	31 00

The drop of a hanger is the distance from top of hanger to center of box.

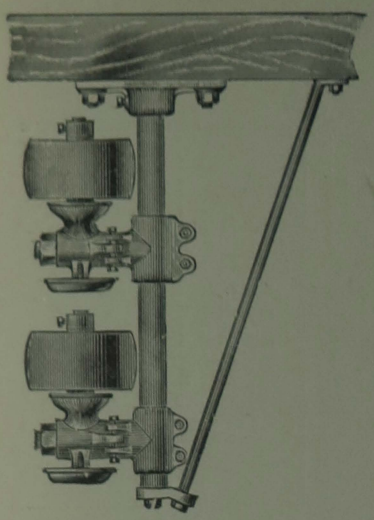


SPECIAL FLOOR STANDS.

LIST.

Diameter of Shaft. Inches.	Height to Center of Shaft. Inches.	Price with Rigid Pillow Block.	Price with Ball and Socket Pillow Block.
$3\frac{7}{16}$	36	$ 51 50	$ 57 00
$3\frac{15}{16}$	36	59 00	67 00
$4\frac{7}{16}$	36	72 00	80 00
$4\frac{15}{16}$	36	86 00	92 00
$5\frac{15}{16}$	36	108 00	118 00

These Floor Stands form the most rigid support for shafts that can be constructed, and are designed for extra heavy work and high speeds, being therefore especially adapted for electric light machinery.



MULE PULLEY STANDS.

FOR CARRYING POWER AROUND A CORNER.

Adjustable in Every Direction.

The line shafts may be at any angle with each other, may not be in the same plane, the pulleys may differ much in diameter, and the belt may be crossed.

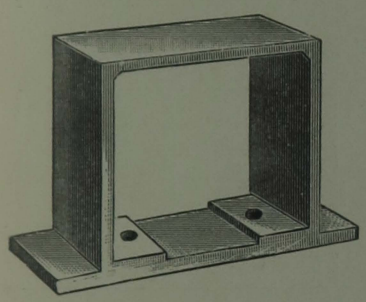
Locate the stand so that its shaft will be about 10 times the width of the belt from the line shaft.

LIST.

Nos.	Single Belt.	Double Belt.
1, For 3 to 5 inch belt	$ 30 00	$ 38 00
2, For 6 to 8 inch belt	38 00	50 00
3, For 9 to 12 inch belt	50 00	80 00
4, For 13 to 15 inch belt	80 00	130 00
5, For 16 to 19 inch belt	130 00	180 00

WALL FRAMES.

FOR PILLOW BLOCKS.

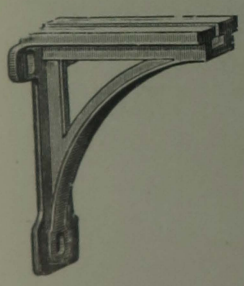


LIST.

Diameter of Shaft. Inches.	Depth of Frame. Inches.	Price.	Diameter of Shaft. Inches.	Depth of Frame. Inches.	Price.
$1\frac{3}{16}$	6	$ 4 40	$3\frac{3}{16}$	10	$15 00
$1\frac{7}{16}$	6	4 40	$3\frac{7}{16}$	10	15 00
$1\frac{11}{16}$	7	5 75	$3\frac{11}{16}$	12	17 50
$1\frac{15}{16}$	7	5 75	$3\frac{15}{16}$	12	17 50
$2\frac{3}{16}$	8	7 50	$4\frac{3}{16}$	12	20 50
$2\frac{7}{16}$	8	7 50	$4\frac{7}{16}$	12	20 50
$2\frac{11}{16}$	9	12 00	$4\frac{15}{16}$	12	26 00
$2\frac{15}{16}$	9	12 00	...	..	.....

SLOTTED BRACKETS.

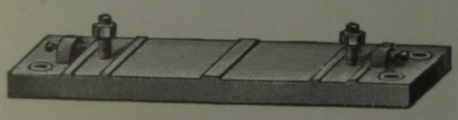
WITHOUT PILLOW BLOCKS, BUT INCLUDING BOLTS TO FASTEN PILLOW BLOCK TO BRACKET.



LIST.

Diameter of Shaft. Inches.	Price.	Diameter of Shaft. Inches.	Price.	Diameter of Shaft. Inches.	Price.
$1\frac{3}{16}$	$ 3 75	$2\frac{7}{16}$	$ 5 40	$3\frac{11}{16}$	$ 9 50
$1\frac{7}{16}$	4 00	$2\frac{11}{16}$	6 10	$3\frac{15}{16}$	10 50
$1\frac{11}{16}$	4 10	$2\frac{15}{16}$	7 00	$4\frac{7}{16}$	12 50
$1\frac{15}{16}$	4 40	$3\frac{3}{16}$	7 45	$4\frac{15}{16}$	14 25
$2\frac{3}{16}$	4 75	$3\frac{7}{16}$	8 60	$5\frac{7}{16}$	16 25

These Brackets are 12 inches from post to center of Shaft—other lengths made to order—and are not to be used with either our Ball and Socket or Rigid Pillow Blocks.



BASE PLATES.

BASE PLATE, WITH ADJUSTING SCREWS, INCLUDING BOLTS, AS SHOWN.

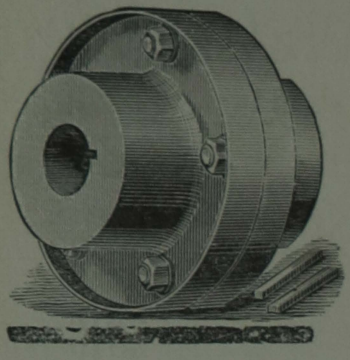
LIST.

Diameter Shaft ..... Inches	$1\frac{1}{8}$	$1\frac{1}{8}$	$2\frac{7}{16}$	$2\frac{7}{16}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$3\frac{7}{16}$	$3\frac{7}{16}$
Price	$ 4 20	$ 4 40	$ 4 70	$ 5 25	$ 6 00	$ 7 00	$ 8 10	$ 9 20
Diameter Shaft ..... Inches	$3\frac{1}{8}$	$3\frac{1}{8}$	$4\frac{7}{16}$	$4\frac{1}{8}$	$5\frac{7}{16}$	$5\frac{1}{8}$	$6\frac{7}{16}$	$6\frac{1}{8}$
Price	$10 30	$11 40	$13 60	$15 80	$18 00	$20 20	$22 40	$24 50

A Base Plate provides a larger footing surface for a Pillow Block and will admit of its being adjusted if desired.

FACE COUPLINGS.

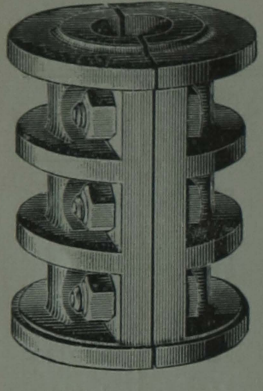
LENGTH ABOUT FOUR DIAMETERS OF SHAFT.



LIST.

Diam. of Shaft. Inches.	Price per Pair.	Price of Keying on Shafts, per Pair.	Diam. of Shaft. Inches.	Price per Pair.	Price of Keying on Shafts, per Pair.
$1\frac{7}{16}$	$ 6 00	$ 1 50	$3\frac{1}{16}$	$26 00	$ 3 75
$1\frac{11}{16}$	7 00	1 75	$3\frac{5}{16}$	29 00	4 00
$1\frac{15}{16}$	8 00	2 00	$4\frac{7}{16}$	40 00	5 00
$2\frac{3}{16}$	9 00	2 25	$4\frac{15}{16}$	50 00	6 00
$2\frac{7}{16}$	10 75	2 50	$5\frac{7}{16}$	60 00	7 00
$2\frac{11}{16}$	13 00	2 75	$5\frac{15}{16}$	70 00	8 00
$2\frac{15}{16}$	16 50	3 00	....	....	....
$3\frac{3}{16}$	20 00	3 25	....	....	....
$3\frac{7}{16}$	23 00	3 50	....	....	....

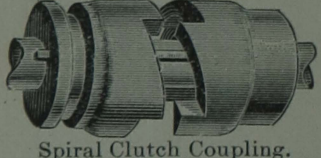
COMPRESSION COUPLINGS.



LIST.

Diam. of Shaft. Inches.	Price per Pair.	Price Fitted.	Diam. of Shaft. Inches.	Price per Pair.	Price Fitted.
$1\frac{3}{16}$	$ 4 00	$ 5 60	$2\frac{11}{16}$	$ 9 00	$13 30
$1\frac{7}{16}$	4 50	6 30	$2\frac{15}{16}$	10 00	14 60
$1\frac{11}{16}$	5 25	7 50	$3\frac{3}{16}$	11 25	16 25
$1\frac{15}{16}$	6 00	8 50	$3\frac{7}{16}$	12 50	17 70
$2\frac{3}{16}$	7 00	10 25	$3\frac{11}{16}$	14 25	19 85
$2\frac{7}{16}$	8 00	11 75	$3\frac{15}{16}$	16 25	22 50

CLUTCH COUPLINGS.



Spiral Clutch Coupling.

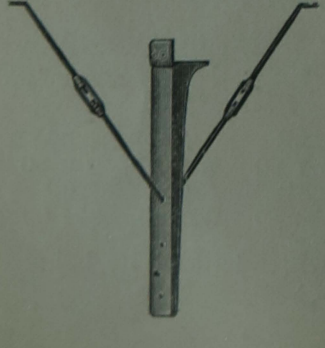
Square Clutch Coupling.

LIST.

Diam. of Shaft. Inches.	Price per Pair.	Price Fitted on Shaft.	Diam. of Shaft. Inches	Price per Pair.	Price Fitted on Shaft.
$1\frac{3}{16}$	$6 00	$8 00	$3\frac{3}{16}$	$ 26 50	$30 25
$1\frac{7}{16}$	7 50	9 50	$3\frac{7}{16}$	32 00	36 00
$1\frac{11}{16}$	9 00	11 25	$3\frac{11}{16}$	40 50	45 00
$1\frac{15}{16}$	10 00	12 50	$3\frac{15}{16}$	50 00	55 00
$2\frac{3}{16}$	12 00	14 75	$4\frac{7}{16}$	65 00	72 00
$2\frac{7}{16}$	14 50	17 50	$4\frac{15}{16}$	81 00	89 00
$2\frac{11}{16}$	17 50	20 25	...	.....	.....
$2\frac{15}{16}$	20 50	23 75	...	.....	.....

GIRDER HANGERS.

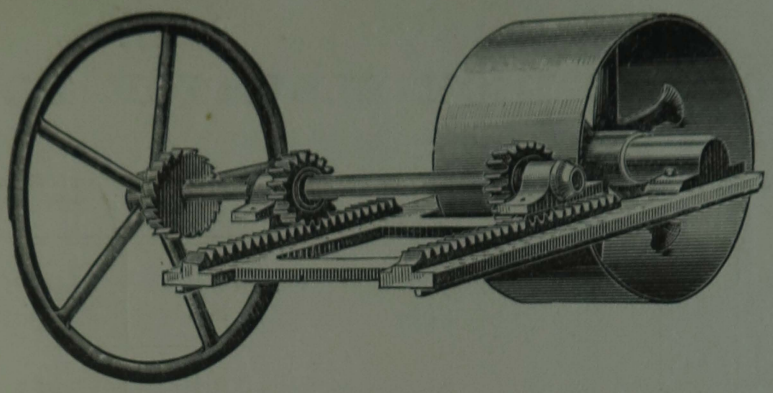
These Hangers are used when it is necessary to have an intermediate bearing between posts. They are neat in appearance and are very rigid, being firmly held near the bearing by wrought iron guys. When ordered with Post Hangers they are fitted and bolted to same.



LIST.

Diam. of Shaft. Inches.	Price.	Diam. of Shaft. Inches.	Price.	Diam. of Shaft. Inches	Price.
$1\frac{3}{16}$	$5 60	$2\frac{3}{16}$	$7 50	$3\frac{3}{16}$	$10 75
$1\frac{7}{16}$	6 00	$2\frac{7}{16}$	8 25	$3\frac{7}{16}$	12 00
$1\frac{11}{16}$	6 35	$2\frac{11}{16}$	9 00	$3\frac{11}{16}$	13 50
$1\frac{15}{16}$	6 80	$2\frac{15}{16}$	9 75	$3\frac{15}{16}$	15 00

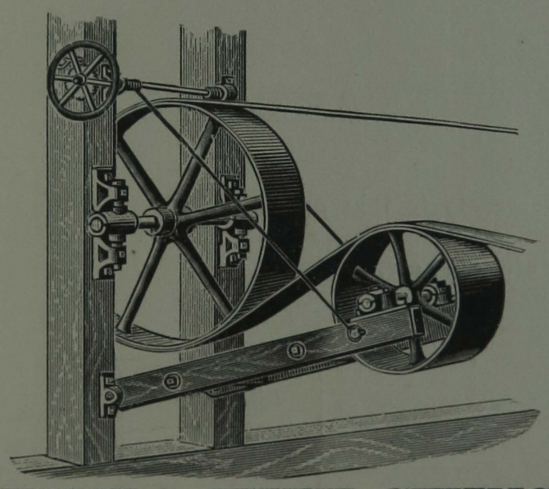
The drop is from bottom of Girder to center of shaft. In ordering, when convenient, state the depth of Girder. We make these Hangers any drop, from 30 inches down.



IRON FRAME BELT TIGHTENERS.

LIST.

Numbers.	Length of Adjustment. Feet.	Size of Pulley, Diameter and Face. Inches.	Diameter of Shaft. Inches.	Price.
1	1½	12 x 9	1 1/16	$40 00
2	1⅔	18 x 12	1 1/16	55 00
3	2	24 x 16	1 5/16	75 00
4	4	30 x 20	2 1/16	150 00
5	5	42 x 38	2 5/16	250 00



BELT TIGHTENERS WITH SWINGING FRAME.

LIST.

Complete, with 14 x 9 Pulley $30 00
Complete, with 16 x 12 Pulley 35 00
Complete, with 18 x 16 Pulley 40 00
Complete, with 20 x 20 Pulley 50 00

FLOOR STAND TENSION CARRIAGES.

LIST.

Diameter of Sheave. Inches.	LENGTH OF CARRIAGE. 4 Feet. Price.	8 Feet. Price.	12 Feet. Price.	16 Feet. Price.
18	$44 00	$48 00	$52 00	$56 00
24	48 00	52 00	56 00	60 00
30	54 00	58 00	62 00	66 00
36	60 00	64 00	68 00	72 00

The above prices include one hundred pound weights.

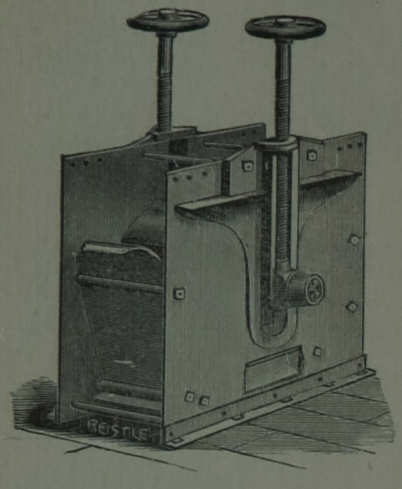
VERTICAL TENSION CARRIAGES.

LIST.

Diameter of Sheave. Inches.	LENGTH OF CARRIAGE. 4 Feet. Price.	8 Feet. Price.	12 Feet. Price.	16 Feet. Price.
18	$42 00	$46 00	$50 00	$52 00
24	46 00	50 00	54 00	58 00
30	50 00	54 00	58 00	62 00
36	56 00	60 00	64 00	68 00

The above prices include one hundred pound weights. Extra weights will be charged at two and one-half cents net per pound.

WROUGHT IRON ELEVATOR BOOTS.



LIST.

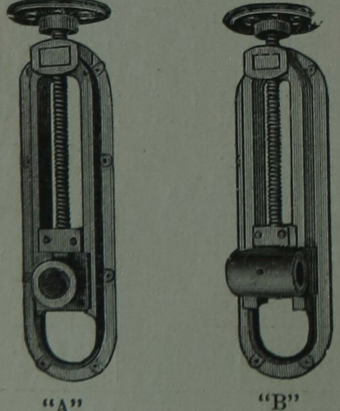
Size of Bucket. Inches.	Size of Pulley. Inches.	Price.
5 x 4	10 x 6	$ 18 50
6 x 4	12 x 7	21 00
7 x 4½	14 x 9	23 00
8 x 5	14 x 10	26 00
9 x 5	16 x 11	30 00
10 x 5½	16 x 12	33 00
11 x 6	18 x 13	36 00
12 x 6	18 x 14	40 00

These Boots are furnished with turned and balanced pulleys, babbitted bearings and tightener complete, as shown in cut.

TAKE-UPS.

For use where it is necessary to take up slack in belts, as in Elevators or Conveyers. Made to pull and push.

In ordering, give diameter of shaft.



"A" "B"

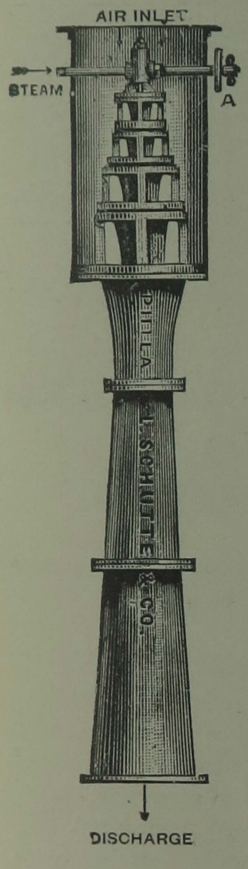
LIST.

Numbers of Frames.	Diameter of Shaft. Inches.	Length of Bearing. Inches.	Price "A."	Price "B."
4	1 1/16	2	$ 2 30	$ 2 60
4	1 3/16	2	2 40	2 70
4	1 5/16	2	2 50	2 80
5	1 3/16	3	3 10	3 40
5	1 5/16	3	3 25	3 60
7	1 7/16	4	4 50	4 95
7	1 9/16	4	4 75	4 25
7	1 11/16	4	5 00	5 50
9	1 15/16	4 5/8	6 50	7 15
9	2 3/16	4 5/8	7 00	7 70
12	2 5/16	5	9 00	9 90
12	2 7/16	5	9 75	10 75
20	2 9/16	6 1/8	11 00	12 10
20	2 11/16	6 1/8	11 75	13 00
20	2 13/16	6 1/8	13 00	14 40
20	2 15/16	6 1/8	14 50	16 00
24	3 5/16	10	16 00	....
36	3 5/16	10	20 00	....
48	3 5/16	12	26 50	....
60	3 5/16	12	32 50	....
72	4 7/16	12	38 50	....

The number of frame indicates length of movement.

KORTING'S BLOWERS AND VENTILATORS.

FOR BOILER FIRING, VENTILATION AND SIMILAR PURPOSES WHERE A LOW COUNTER PRESSURE OR REFRACTION MEETS THE REQUIREMENTS.



When used as a Blower, attachment is made to the bottom flange, and when used as a Ventilator or Exhauster, attachment is made to top flange; or it can be used as a Blower and Exhauster combined to accelerate flow of gas in a continuous pipe.

The machine can be placed vertical or horizontal. When used for boiler firing it is generally placed vertical on an elbow attached to the side wall or boiler, or on top of a brick flue carried through the side wall from ash pit. The passage leading into the ash pit must always be from the side, front or back, as an inlet from bottom would blow a hole through the fire bed and prevent a proper distribution of the blast under the grates.

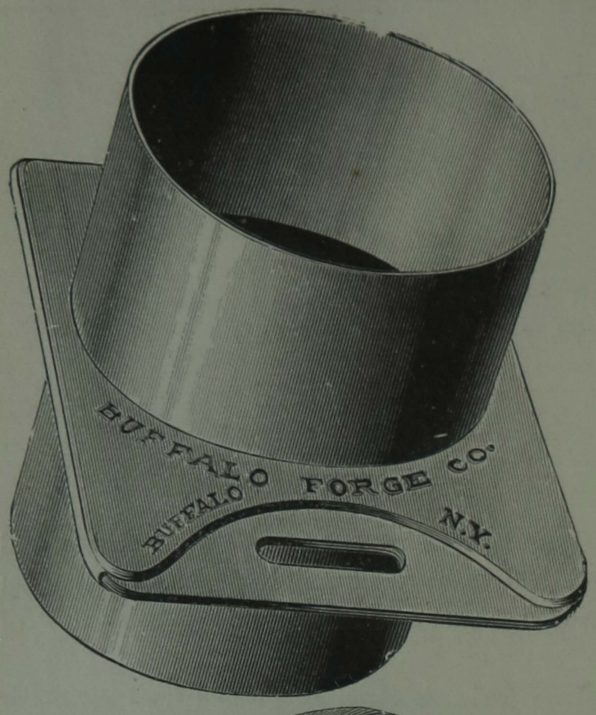
MANIPULATION.

Regulate blast with side handle.

Start and stop by opening and closing a valve in steam pipe.

LIST.

Numbers.	Capacity in Cubic Feet per Hour.	DIAMETER.			Coal to be Burnt per Hour. Pounds.		Price.
		Steam Pipe. Inches.	Inlet. Inches.	Discharge. Inches.			
00	8,000	3/8	4	3	Maximum amount of coal burnt in furnace for which blower is suitable.	40	$ 25 00
0	16,000	1/2	5	4		80	30 00
1	30,000	1/2	8	6		150	40 00
1½	45,000	3/4	9	7		225	50 00
2	60,000	3/4	11	8		300	60 00
2½	90,000	3/4	12	9		450	70 00
3	120,000	1	14	10		600	80 00
3½	180,000	1	16	12		900	90 00
4	240,000	1¼	18	14		1,200	100 00
6	500,000	1½	24	18		2,500	200 00
8	1,000,000	2	32	24		5,000	350 00
10	2,000,000	2½	42	32		10,000	600 00

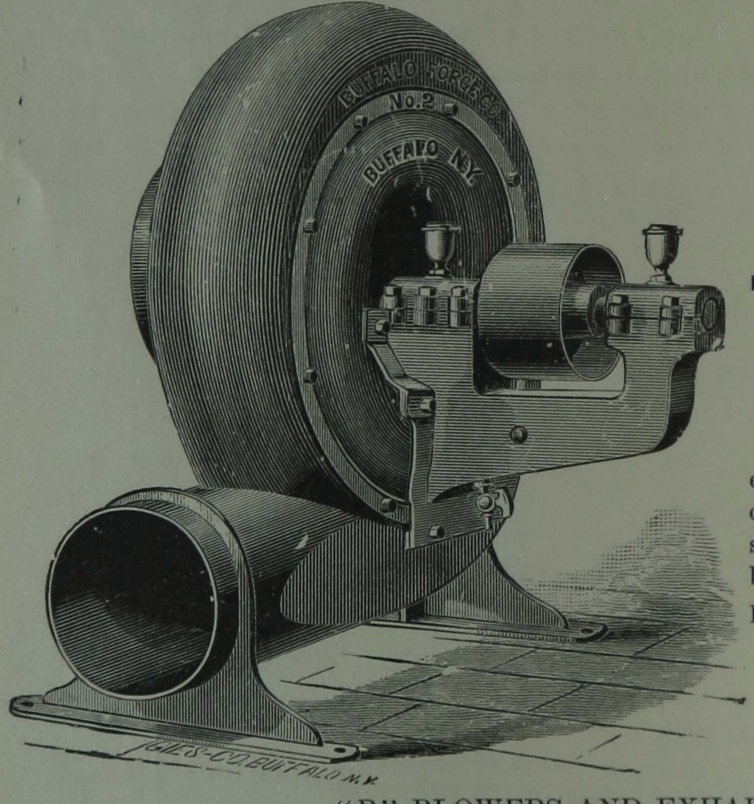


BUFFALO IMPROVED BLAST GATES.

FOR OPENING AND CLOSING BLAST PIPES.

LIST.

Size. Inches.	Material.	Price.
2	Cast Iron with Steel Slide	$1 00
2½	Cast Iron with Steel Slide	1 25
3	Cast Iron with Steel Slide	1 50
4	Cast Iron with Steel Slide	2 00
5	Cast Iron with Steel Slide	2 25
6	Cast Iron with Steel Slide	2 50
8	Cast Iron with Steel Slide	3 50



BUFFALO BLOWERS AND EXHAUSTERS.

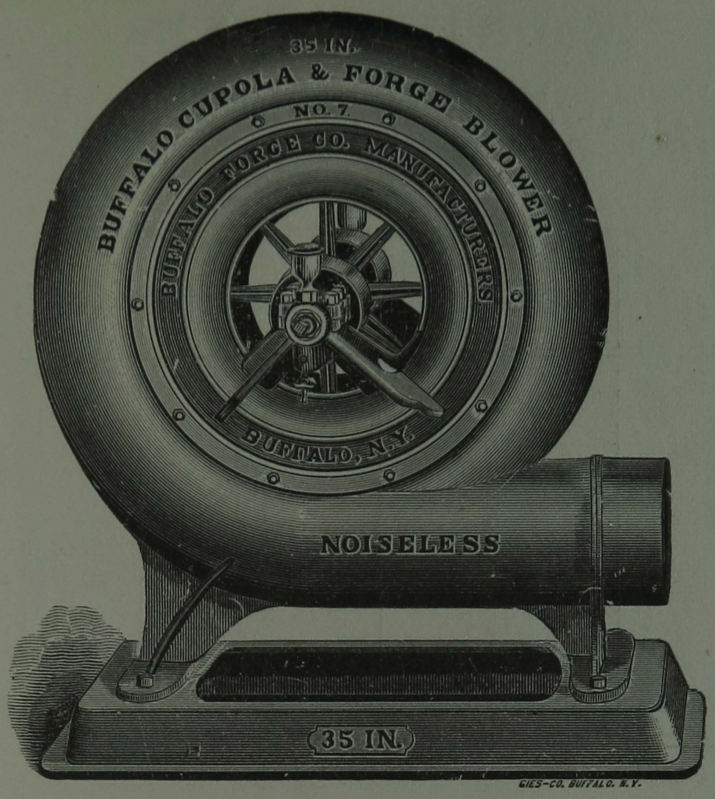
FOR FORGES, FURNACES, VENTILATING, DRYING AND COOLING.

"B" Pattern.

These fans are built with special reference to durability and smooth running under prolonged and arduous service, having solid shell or case, with a smaller number of parts than any other made, an important point in all high-speed machinery.

"B" BLOWERS AND EXHAUSTERS—LIST.

Numbers.	Height. Inches.	Diameter of Outlet. Inches.	Diameter of Inlet. Inches.	Diameter of Pulley. Inches.	Face of Pulley. Inches.	Price.
1 B	15¼	5	5	2¾	2¼	$ 20 00
2 B	19¼	6	6	3¼	2⅝	25 00
3 B	25	7½	7½	4	3¼	33 00
4 B	29	9	9	5	4	44 00
5 B	32	10½	10½	5¾	4½	55 00
6 B	37½	12	12	6½	5½	70 00
7 B	43	14	14	7½	6½	90 00
8 B	48	16½	16	8½	7½	150 00
9 B	55	18	18	9½	8½	200 00
10 B	68	21	21	12	10	250 00
11 B	79	24	24	14	12	350 00



BUFFALO STEEL PRESSURE BLOWERS.

FOR CUPOLA AND FORGE FIRES, AND OTHER HIGH PRESSURE DUTY.

The special features of these Blowers are: long, heavy journals in standard ratio of length to diameter of 6 to 1, the solid shell being cast in one piece, and fewer parts than in any other machine; under any service the bearings being in perfect alignment vertically and laterally with the rest of the machine, making it far superior as to durability, smooth running and economy of power, than any other make.

LIST.

Numbers.	Height. Inches.	Diameter of Outlet. Inches.	Diameter of Pulley. Inches.	Face of Pulley. Inches.	Price without Countershaft.	Price with Countershaft.	ADJUSTABLE BED.	
							Price with Bed but without Countershaft.	Price with Bed and with Countershaft.
1	12½	3⅝	2½	1¾	$ 12 00	$ 20 00	.....	.....
2	15	4	2½	2¼	18 00	28 00	.....	.....
3	20	4⅝	3¼	2⅝	26 00	38 00	.....	.....
4	24	5⅛	4	3	36 00	52 00	.....	.....
5	26	5½	4¼	3	44 00	64 00	.....	.....
6	30	6¼	4½	3½	55 00	80 00	.....	.....
7	35	7¼	5	4½	70 00	100 00	$100 00	$135 00
8	40	8⅝	6	4½	90 00	130 00	130 00	175 00
9	45	10	7	5	115 00	170 00	170 00	230 00
10	56	12¼	8	5¾	160 00	230 00	265 00	350 00
11	66	14⅜	9	6¼	225 00	300 00	330 00	435 00
11½	76	16½	10	7	275 00	350 00	380 00	500 00
12	80	18	10	8	325 00	400 00	475 00	625 00

Nos. 1 to 6 Blowers, inclusive, have one pulley, and Nos. 7 to 12 have two pulleys.

COUNTER SHAFTS.

In ordering or making inquiry as to cost, always mention the speed of main line of shafting and the largest pulley which can be used thereon. Tight and loose pulleys may be furnished on these counter-shafts at a small additional price, where desired.

LIST.

Numbers of Steel Pressure Blowers.	Diameter of Pulley Driving Blowers. Inches.	Diameter of Pulley Driven by Main Belt from Line Shaft. Inches.	Diameter of Shaft. Inches.	Price with One Driving Pulley.	Price with Two Driving Pulleys.
1	12	4	7/8	$ 8 00	
2	14	5	1	10 00	
3	16	6	1 1/8	12 00	
4	18	7	1 1/4	16 00	
5	21	8	1 3/8	20 00	
6	26	9	1 5/8	25 00	
7	30	10	1 3/4	30 00	$ 35 00
8	32	12	1 15/16	40 00	45 00
9	36	14	2 1/4	50 00	60 00
10	40	16	2 7/16	70 00	80 00
11	42	17	2 3/4	80 00	90 00
11 1/2	44	18	3	90 00	100 00
12	44	18	3	100 00	110 00

BUFFALO PUNCH, SHEAR AND BAR CUTTERS.

LIST.

No. 1—Price, with 3/32-inch and 1/8-inch Punch and Die ..... $ 40 00
No. 2—Price, with 1/8, 3/16, 1/4-inch Punch and Die 50 00
No. 3—Price, with 1/4, 5/16, 3/8-inch Punch and Die 70 00
No. 4—Price, with 1/4, 3/8, 1/2-inch Punch and Die 100 00

CAPACITIES.

No. 1 will shear 1/4-in. strap iron 1 1/2 in. wide, will punch 1/8 in. in 1/8-in. iron, and cut off 3/8 in.
No. 2 will shear 1/2-in. strap iron 2 in. wide, will punch 1/4 in. in 1/4-in. iron, and cut off 3/4 in.
No. 3 will shear 1/2-in. strap iron 3 in. wide, will punch 3/8 in. in 3/8-in. iron, and cut off 1 in.
No. 4 will shear 5/8-in. strap iron 3 in. wide, will punch 1/2 in. in 1/2-in. iron, and cut off 1 1/4 in.

BUFFALO CONTINUOUS SHEARS.

LIST.

No. 6—Continuous Shear, 1/8-inch Flat ..... $ 30 00
No. 7—Continuous Shear, 3/16-inch Flat 40 00
No. 8—Continuous Shear, 1/4-inch Flat 50 00
No. 9—Continuous Shear, 3/8-inch Flat 100 00

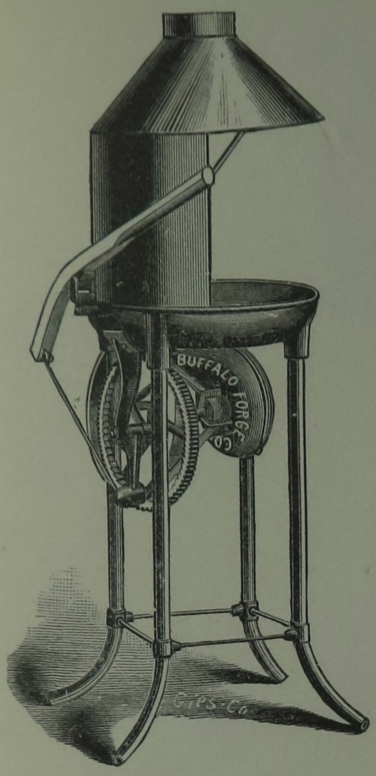
BUFFALO PUNCHES.

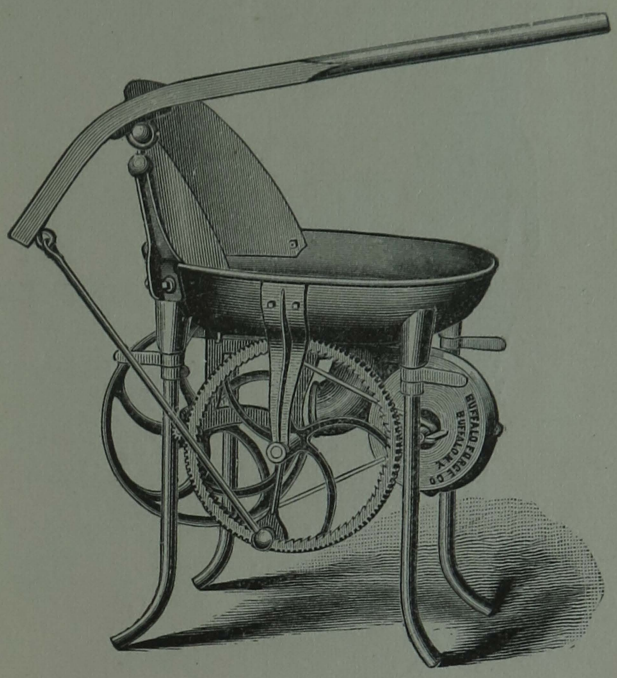
LIST.

No. 12—Price, with 3/32-inch and 1/8-inch Punch and Die $30 00
No. 13—Price, with 1/8, 3/16, 1/4-inch Punch and Die 40 00
No. 14—Price, with 1/4, 5/16, 3/8-inch Punch and Die 50 00
No. 15—Price, with 1/4, 3/8, 1/2-inch Punch and Die 60 00

CAPACITIES.

No. 12 will punch 1/8-in. hole in 1/8-in. iron.
No. 13 will punch 1/4-in. hole in 1/4-in. iron.
No. 14 will punch 3/8-in. hole in 3/8-in. iron.
No. 15 will punch 1/2-in. hole in 1/2-in. iron.





BUFFALO PORTABLE FORGES.

LIST.

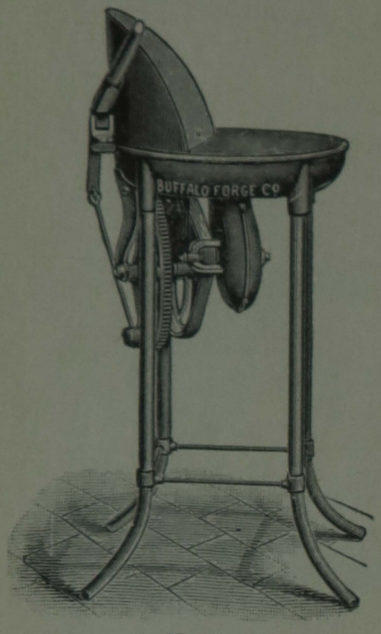
Numbers.		Price.
1	Half open hood; height, 29 inches; fan, 10 inches; hearth, 21x27 inches; weight, 140 pounds	$ 40 00
2	Closed hood; capacity same as No. 1; weight, 150 pounds	42 00
3	Capacity, height, weight, etc, same as No. 1	36 00

TUYERE IRONS.

LIST.

Numbers.		Price.
1	Duck's Nest	$.....
2	Duck's Nest	.....
1	Negro Head	.....
2	Negro Head	.....
3	Negro Head	.....
	Norton's Patent	.....

BUFFALO PORTABLE FORGES.



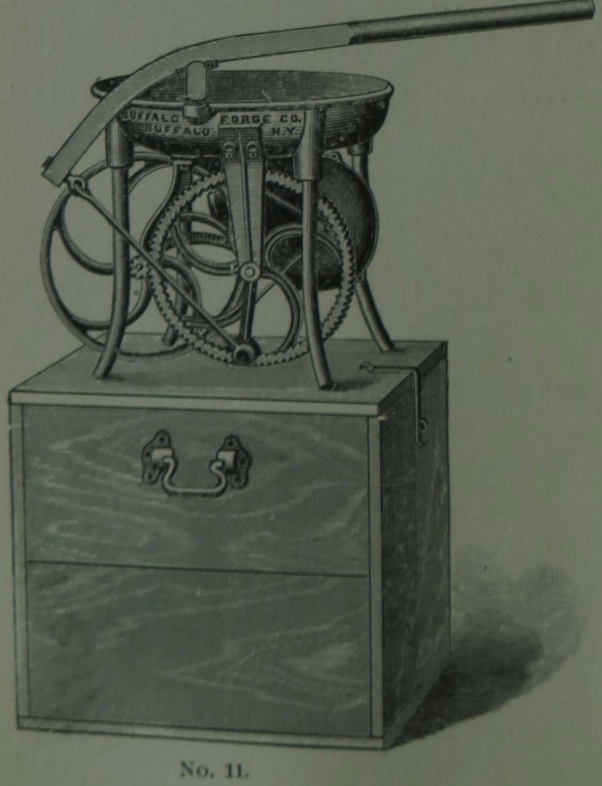
No. 5.

No. 4. Half open hood. Height, 33 inches; size of hearth, 18 inches diameter; weight, 75 pounds. Price, $27.00.

No. 5. Same size and capacity as No. 4; weight, 60 pounds. Price, $24.00.

No. 10.

Nos. 4 and 5 will produce a welding heat on iron 1½ inches in diameter in five minutes, and do heavier work if required; but on account of size of fire-place and general capacity, are specially recommended for use of die sinkers, model and tool makers, plumbers, tinsmiths, jewelers, dentists, locksmiths and small hardware manufacturers, for heating and tempering tools of all kinds.



No. 11.

No. 6. Size and capacity same as No. 4; closed hood; weight, 80 pounds. Price, $30.00.

No. 7. With dash; height, 15 inches; hearth, 15 inches; fan, 6 inches diameter; weight, 50 pounds. Price, $16.00.

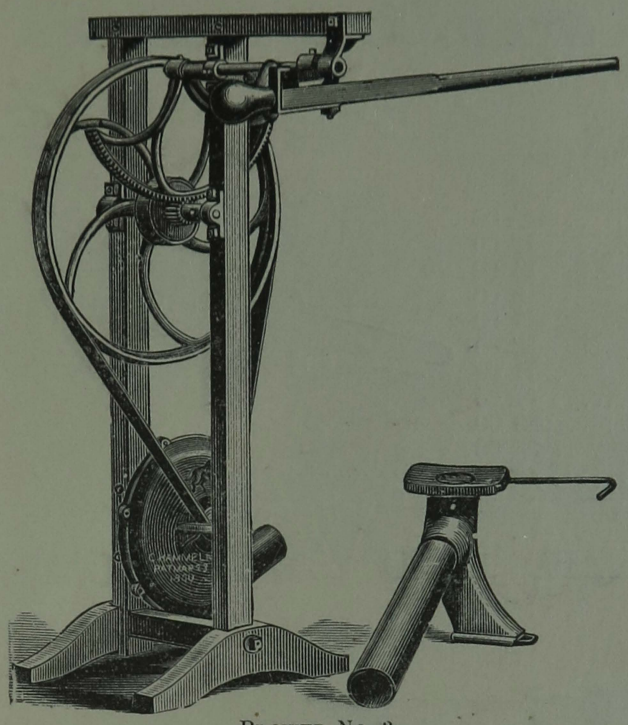
No. 8. Same as No. 7, open hood. Price, $18.00.

No. 9. Same as No. 7, closed hood. Price, $20.00.

No. 10. Railroad and Bridge Builders' Forge. Price, $32.00.

No. 11. Capacity same as No. 5, but shorter legs, making it compact for transportation. Weight, with case, 60 pounds. Ample room for full line of Blacksmiths' tools. Price with case, $26.00.

No. 12. Bellows' Forge. Practically the same as No. 10, Forge, with bellows for supplying the blast. Weight, 125 pounds. Price, $32.00.



BLOWER NO. 3.

Made for Right or Left Hand.

BUFFALO BLACKSMITHS' HAND BLOWERS.

BUFFALO STANDARD.

More than 12,000 Buffalo No. 3 Hand Blowers in daily use throughout this country, every one of which gives entire satisfaction and more than surprises its users as to durability. Do not confound them with the cheap imitations, but always ask for and insist upon getting the genuine "Buffalo," and you will be assured of entire satisfaction.

Price, $23.00; tuyere, $2.00 extra.

Blower No. 5 is designed to meet requirements where, for convenience, a Crank Blower is desirable. We claim for it "simple perfection in Crank Blowers."

In its construction we have embodied our patent ratchet crank, which does not continue to revolve when released by the operator, but falls into position, which is most convenient in starting the blower. The gears are properly proportioned so as to give the required speed to fan at a slow motion of crank, and with the least loss of power by friction. At 30 turns of crank per minute, this blower will blow strong enough to heat 3 to 4-inch iron in from 5 to 10 minutes.

Price, $18.00; tuyere, $2.00 extra.

No. 2. Size of fan, 14 inches; height, 35 inches; length, 32 inches; weight, 130 pounds; with tuyere, 150 pounds.

Price $30.00; tuyere, $2.00 extra.

This Blower is designed for all ordinary blacksmith purposes, producing a welding heat on 3-inch iron in 5 minutes, and on 4-inch iron in 10 minutes; heavier work can be done if desired.

No. 4. Size of fan, 17 inches; height, 35 inches; length, 35 inches; weight, 225 pounds.

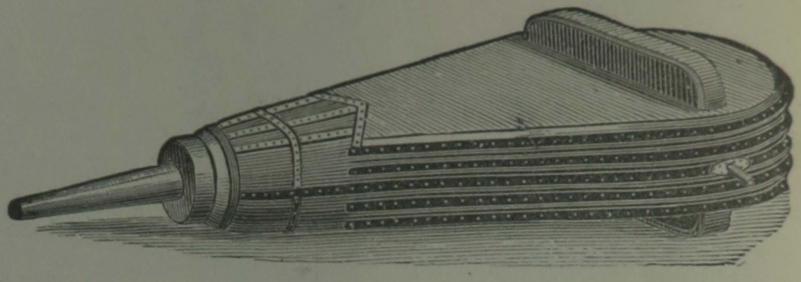
Price, $34.00; tuyere, $2.00 extra.

This is the largest Hand Blower made, and is especially designed for flange fires in boiler shops, and extra heavy work in blacksmith shops, and will do heavier work than any other Hand Blower made.

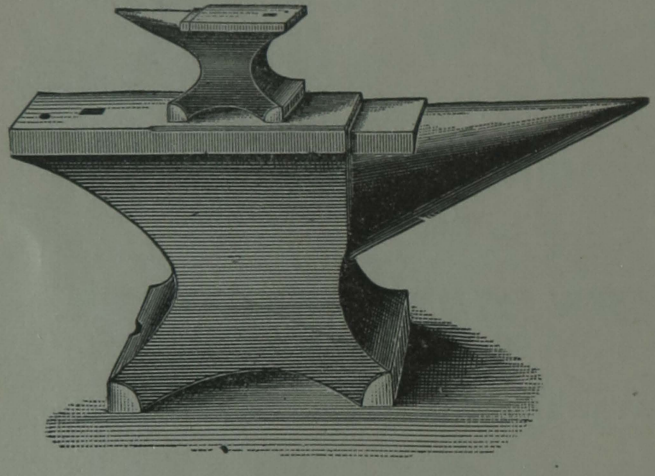
STANDARD BELLOWS.

LIST.

Standard.		Extra Long.	
24 in.	$10 00	24 in.	$12 00
26 in.	11 00	26 in.	13 00
28 in.	12 00	28 in.	14 00
30 in.	13 00	30 in.	15 00
32 in.	14 00	32 in.	17 00
34 in.	16 00	34 in.	19 00
36 in.	18 00	36 in.	21 00
38 in.	20 00	38 in.	24 00
40 in.	23 00	40 in.	28 00
42 in.	27 00	42 in.	34 00
44 in.	32 00	44 in.	40 00



WROUGHT AND CAST IRON ANVILS.

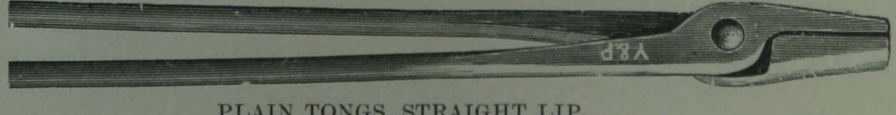


LIST.

	Per Pound.
Peter Wright's, 70 to 80 pounds	$0 20
Peter Wright's, 80 to 200 pounds	18
Peter Wright's, 200 to 300 pounds	18
Peter Wright's, 300 to 400 pounds	18
Wright's Pattern	16
Eagle	10

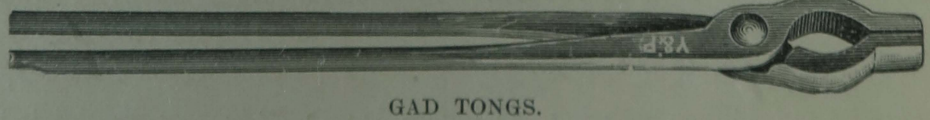
BLACKSMITH TONGS.

LIST.



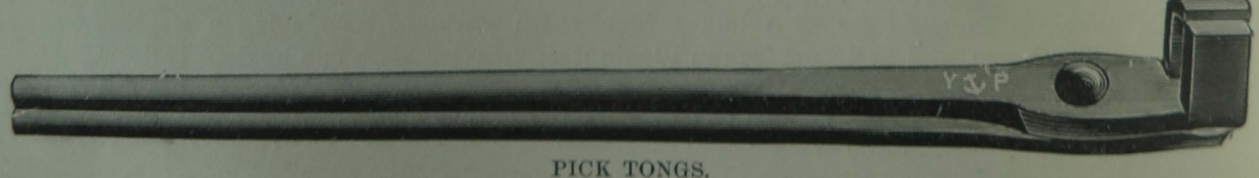
PLAIN TONGS, STRAIGHT LIP.

Per dozen ..... 18 inch, $6 70; 20 inch, $7 20; 22 inch, $7 70; 24 inch, $8 90



GAD TONGS.

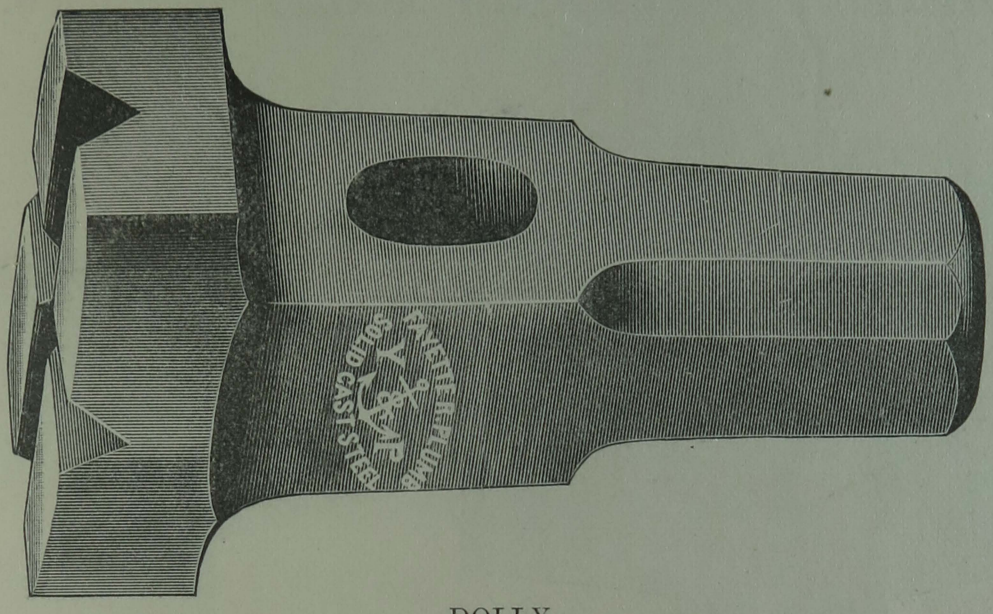
18 to 24 inch ..... per pound, 60 cents



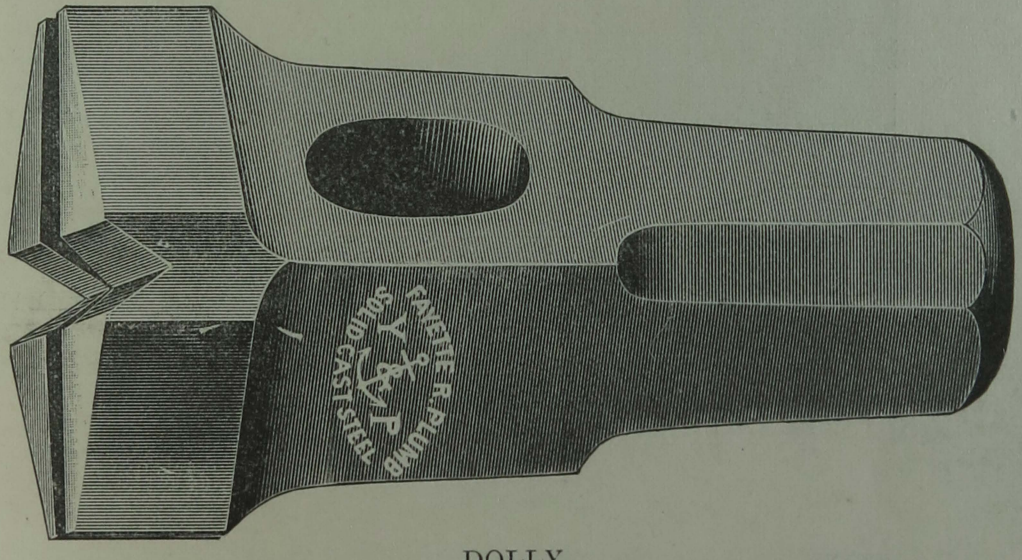
PICK TONGS.

18 to 24 inch ..... per pound, 60 cents

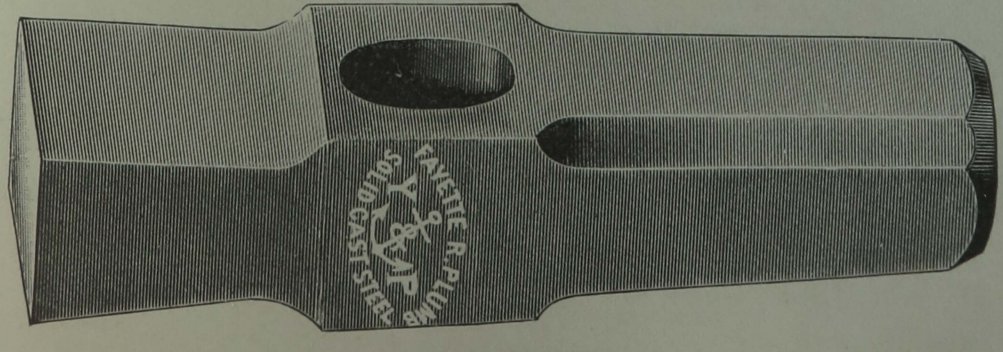
DRILL SHARPENING TOOLS.



DOLLY.



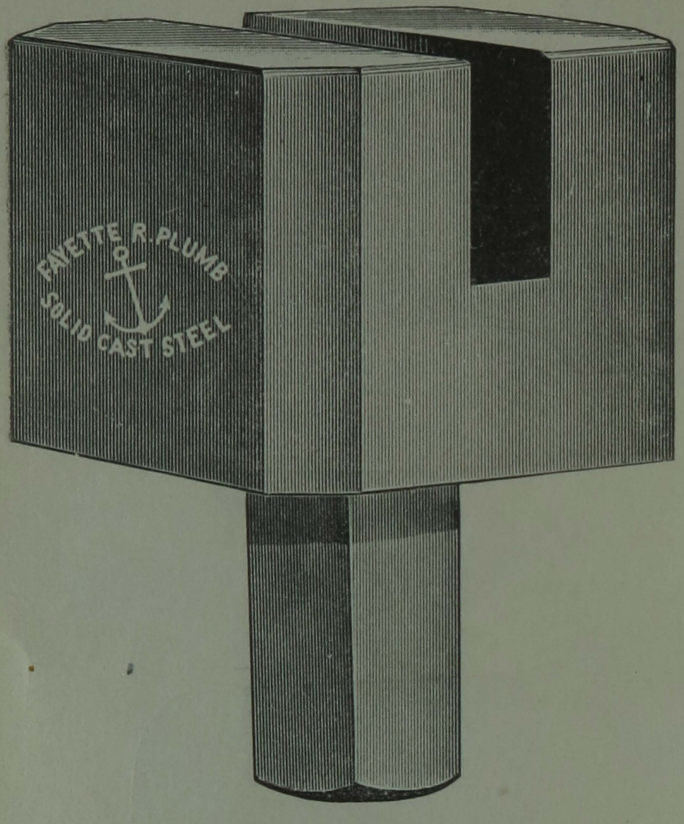
DOLLY.



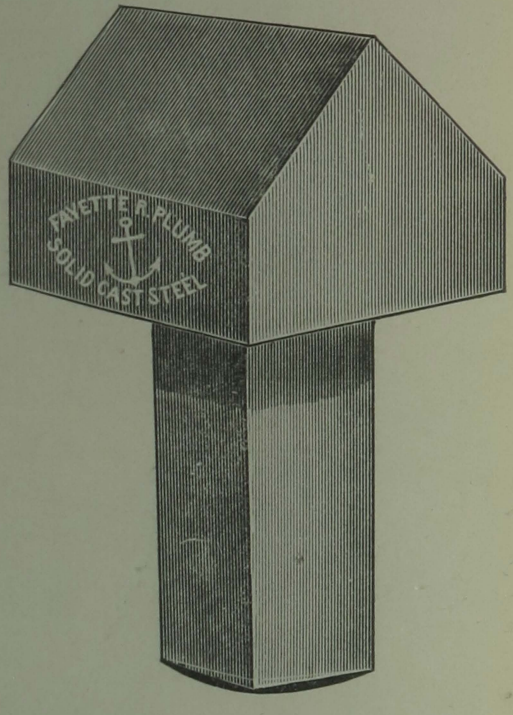
SET HAMMER.

Price, per pound..... 80 cents

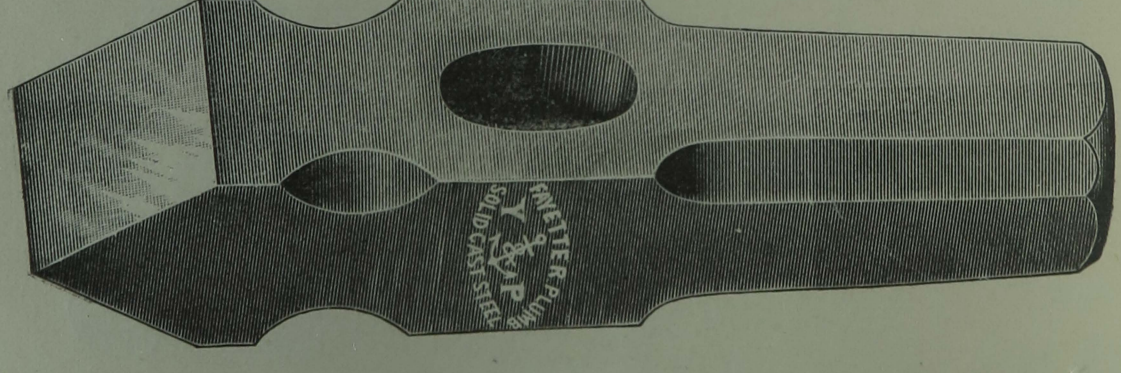
DRILL SHARPENING TOOLS.—Continued.



SOW.



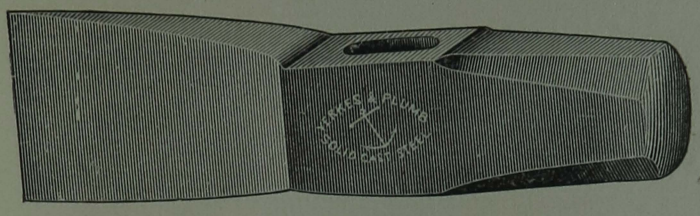
BOTTOM SPREADER.



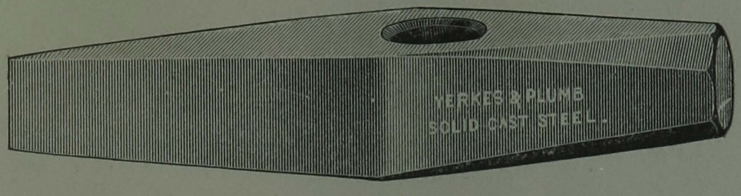
TOP SPREADER.

Price, per pound..... 80 cents

BLACKSMITH'S TOOLS.

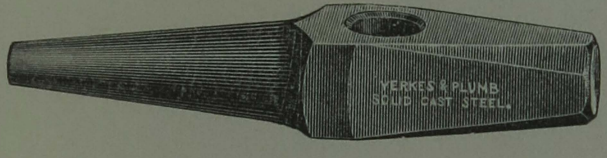


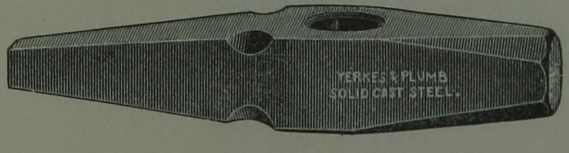
HOT CUTTING CHISELS.



COLD CUTTING CHISELS.

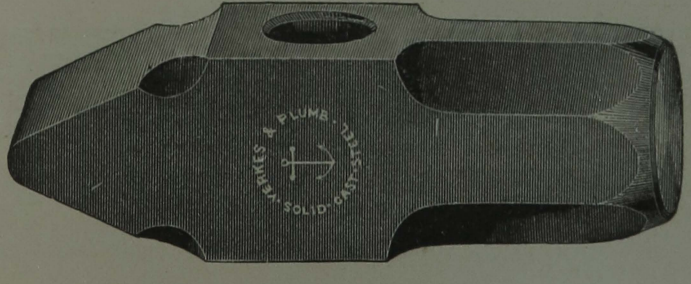
Price, per pound ..... 80 cents





PUNCHES.

Price, per pound ..... 80 cents



SLEDGES.

Price, per pound –3 to 5 pounds ..... 36 cents

Price, per pound–5 pounds and over ..... 30 cents

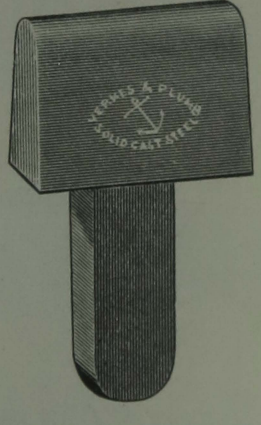
BLACKSMITH'S TOOLS---Continued.

TOP SWAGE.

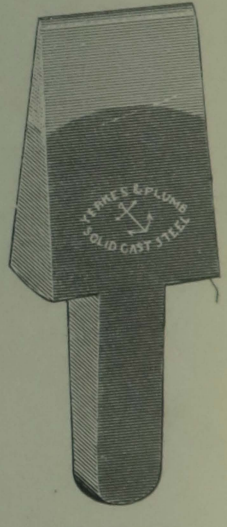
TOP FULLER.

FLATTERS.

BOTTOM SWAGE.

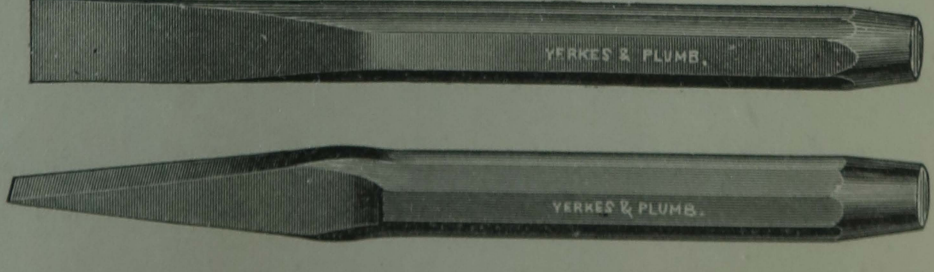


BOTTOM FULLER.



HARDIE.

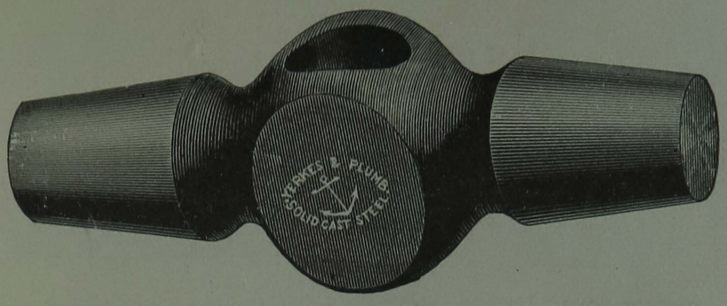
Price, per pound..... 30 cents



CAPE AND COLD CHISELS.

SOLID CAST STEEL.

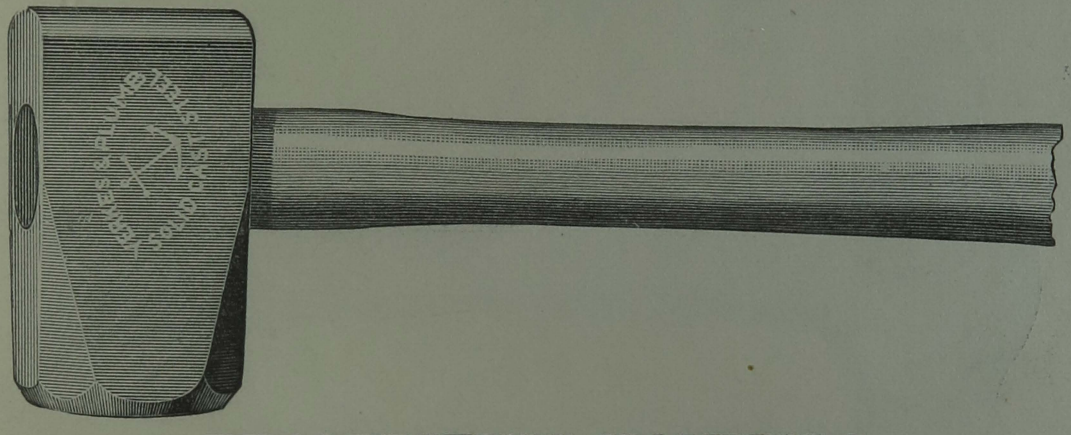
Price, per pound..... $1 00



BOILER MAKERS' HAMMERS.

Weight 2 to 3 pounds.

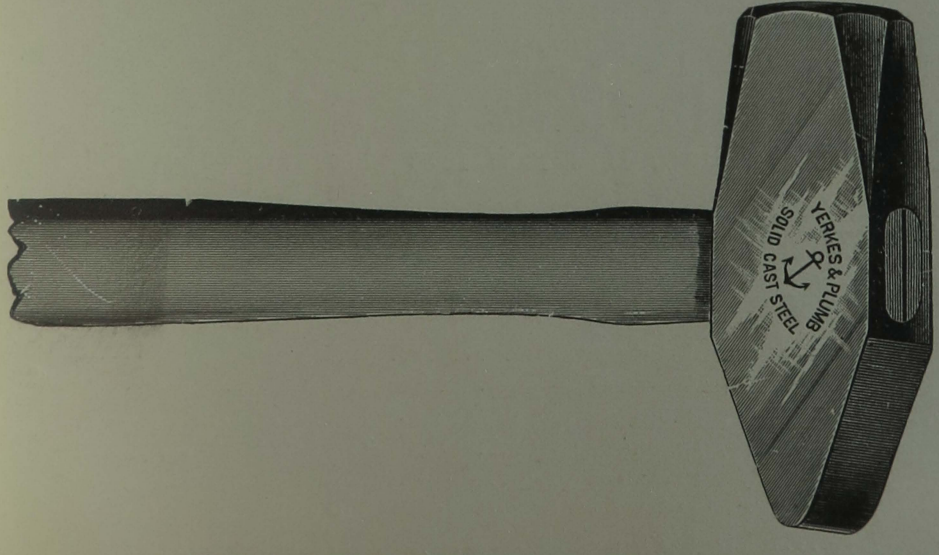
Price, per pound ..... 50 cents



PROSPECTING HAMMERS.

LIST.

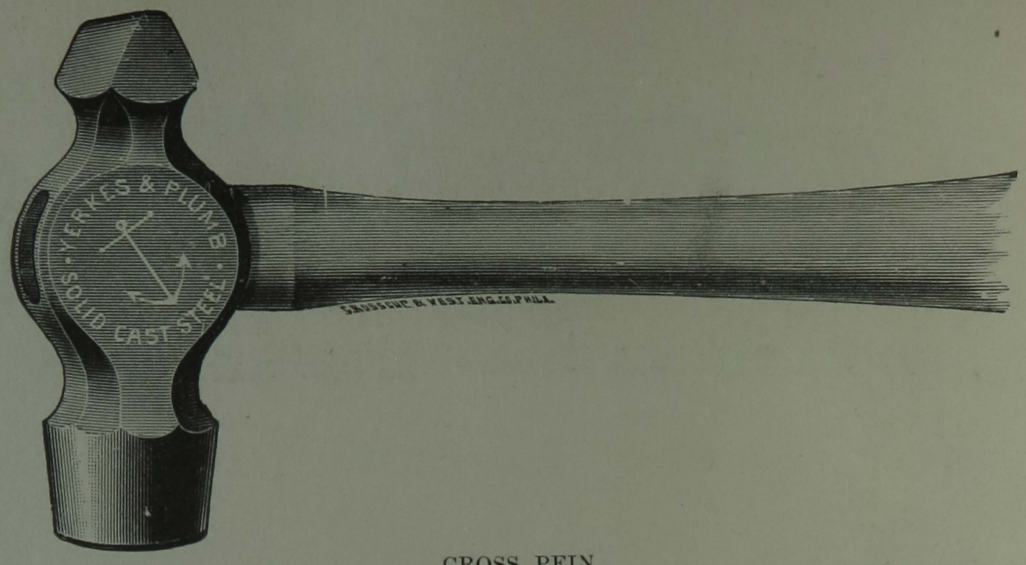
Size Numbers.	Weight.	Price per Dozen.
0	1 pound	$ 13 00
1	1 pound 6 ounces	14 00
2	1 pound 12 ounces	15 00
3	2 pounds	16 00



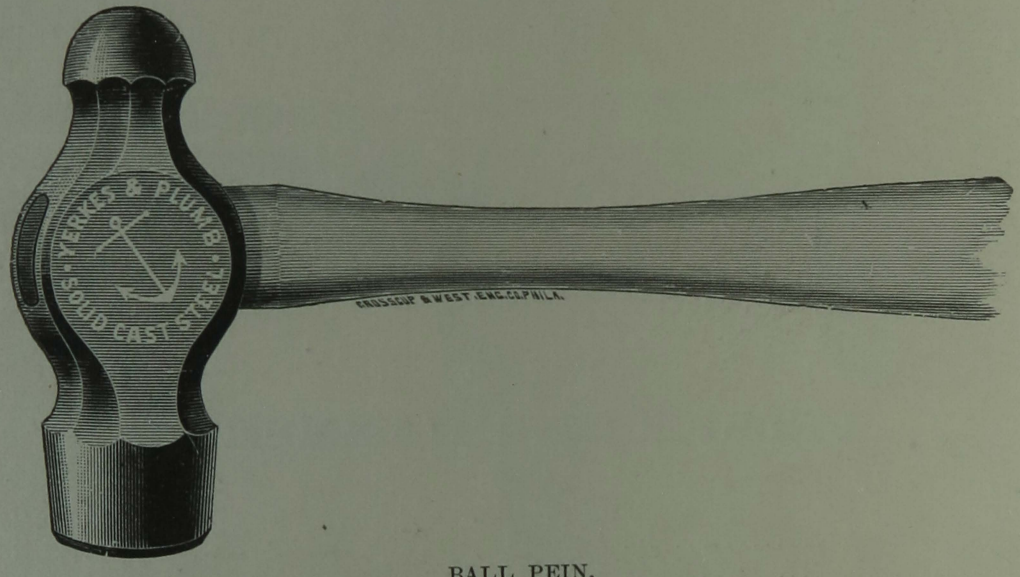
LIST.

Nos.	Weight.	Price per Doz.
0	1 lb. 10 oz.	$13 00
1	2 lbs.	14 00
2	2 lbs. 10 oz.	15 00
3	3 lbs.	16 00
4	3 lbs. 8 oz.	17 00
5	4 lbs. 8 oz.	19 00

BLACKSMITHS' HAND HAMMERS.



CROSS PEIN.



BALL PEIN.

MACHINISTS' HAMMERS.

BALL, STRAIGHT OR CROSS PEIN.

LIST.

Numbers.....	0000	000	00	0	1	2	3	4	5	6	7	8	9
Weight.....	6 oz.	8 oz.	12 oz.	1 lb.	1 lb. 4 oz.	1 lb. 8 oz.	1 lb. 12 oz.	2 lb.	2 lb. 4 oz.	2 lb. 8 oz.	2 lb. 12 oz.	3 lb.	3 lb. 8 oz.
Price, per doz.	$12 00	12 00	12 00	12 50	13 50	14 50	15 50	16 50	17 50	19 00	20 50	22 00	24 00

RIVETING HAMMERS.

LIST.

Numbers.	Weight.	Price, per Dozen.
0	4 ounces	$ 5 50
1	7 ounces	5 75
2	9 ounces	6 00
3	12 ounces	6 25
4	15 ounces	6 50
5	1 pound 2 ounces	7 00
6	1 pound 6 ounces	7 50
7	1 pound 10 ounces	8 00

ADZE EYE, BELL FACE NAIL HAMMERS.

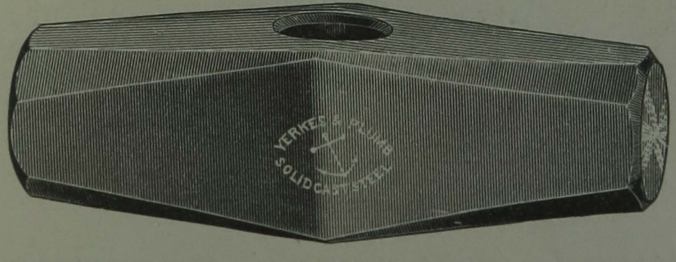
LIST.

Numbers.	Weight. Pounds.	Ounces.	Price. Per Dozen.
1	1	4	$ 9 00
1½	1		8 50
2		13	8 00
3		7	7 50

CARRIAGE IRONERS' HAMMERS.

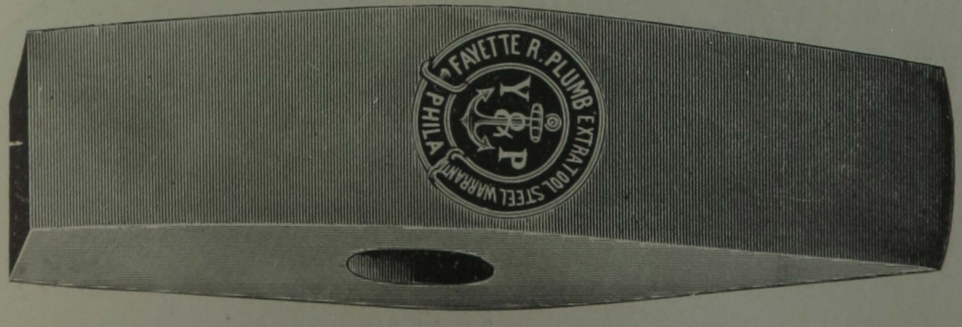
LIST.

Numbers.	Weight. Pounds.	Ounces.	Price. Per Dozen.
1	1	14	$15 50
2	2	6	16 50
3	2	12	17 50



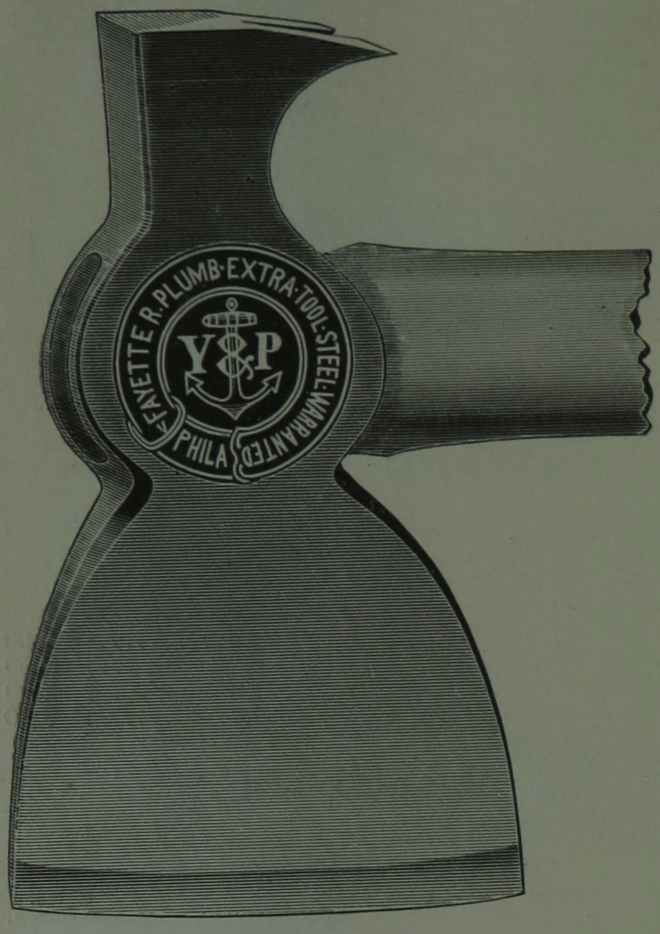
STRIKING OR DRILLING HAMMERS.

Price, per pound—3 to 5 pounds..... 36 cents
Price, per pound—5 pounds and over..... 30 cents



SORTING HAMMERS.

Price, per pound..... 30 cents



CLAW HATCHETS.

LIST.

Numbers.	Weight. Pounds.	Ounces.	Price. Per Dozen.
1	1	3	$ 9 00
2	1	9	9 50
3	1	15	10 00

SHINGLING HATCHETS.

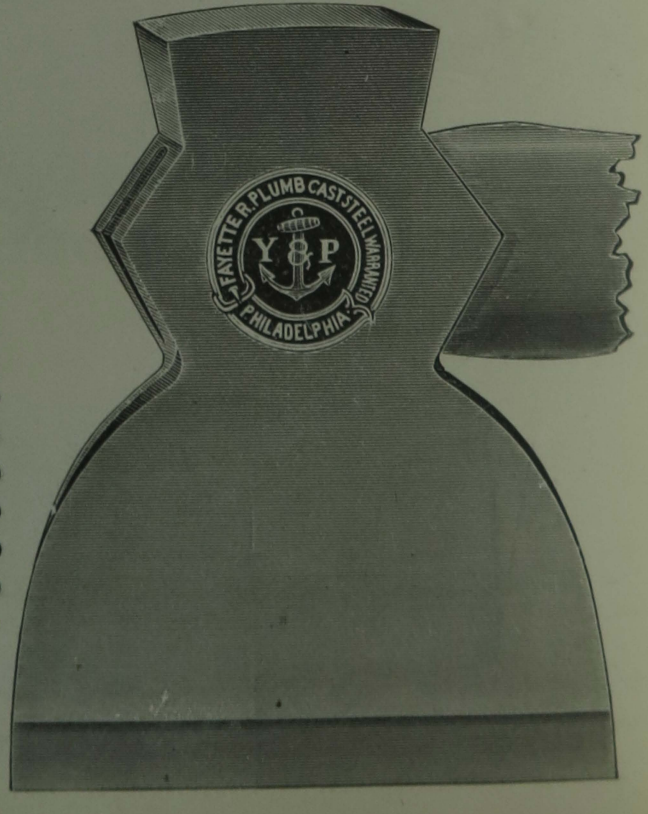
LIST.

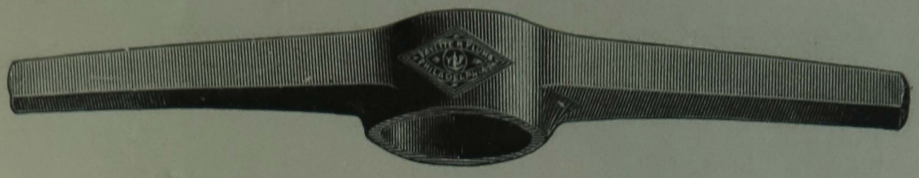
Numbers.	Weight. Pounds.	Ounces.	Price. Per Dozen.
1	1	1	$ 8 00
2	1	7	8 50
3	1	13	9 00
4	2	3	9 50

BROAD HATCHETS.

LIST.

Numbers.	Weight. Pounds.	Ounces.	Price. Per Dozen.
1	1	8	$ 10 50
2	1	12	11 50
3	2	2	13 00
4	2	8	14 50
5	2	14	16 50
6	3	4	18 00
7	3	12	19 50
8	4	4	22 00





PICK EYES.

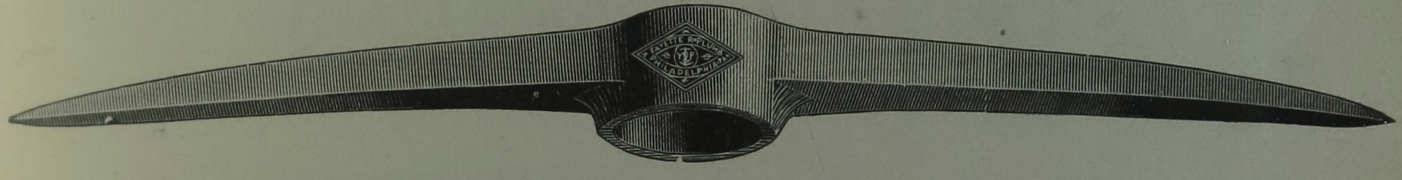
LIST.

Numbers	1	2	3	4	5	6	7
Drifting ..... Per Dozen	$7 50	$8 50	$9 00	$ 9 50	$10 00	.....	.....
Surface. ..... Per Dozen	....	9 00	9 50	10 00	10 50	$11 00	$11 50

POLL PICKS.

LIST.

Numbers	1	2	3	4	5	6
Weight ..... Pounds	3½	4	4½	5	6	6¾
Price ..... Per Dozen	$15 00	$16 00	$17 00	$18 50	$20 00	$21 50



DRIFTING PICKS.

LIST.

Numbers	1	2	3	4	5
Weight ..... Pounds	3	4	4½	5	6
Length ..... Inches	19	21	23	25	26
Price ..... Per Dozen	$12 50	$14 00	$15 00	$16 00	$17 50

RAILROAD PICKS.

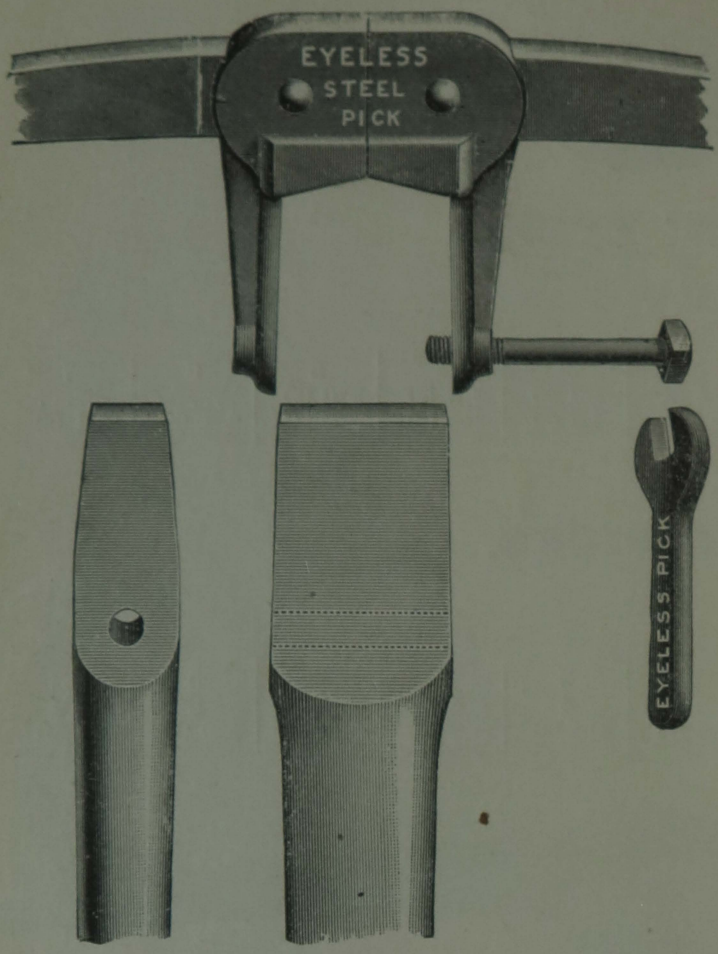
LIST.

Weight ..... Pounds	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12
Price ..... Per Dozen	$11 00	$12 00	$13 00	$14 00	$16 00	$18 00	$20 00	$22 00

PROSPECTING PICKS.

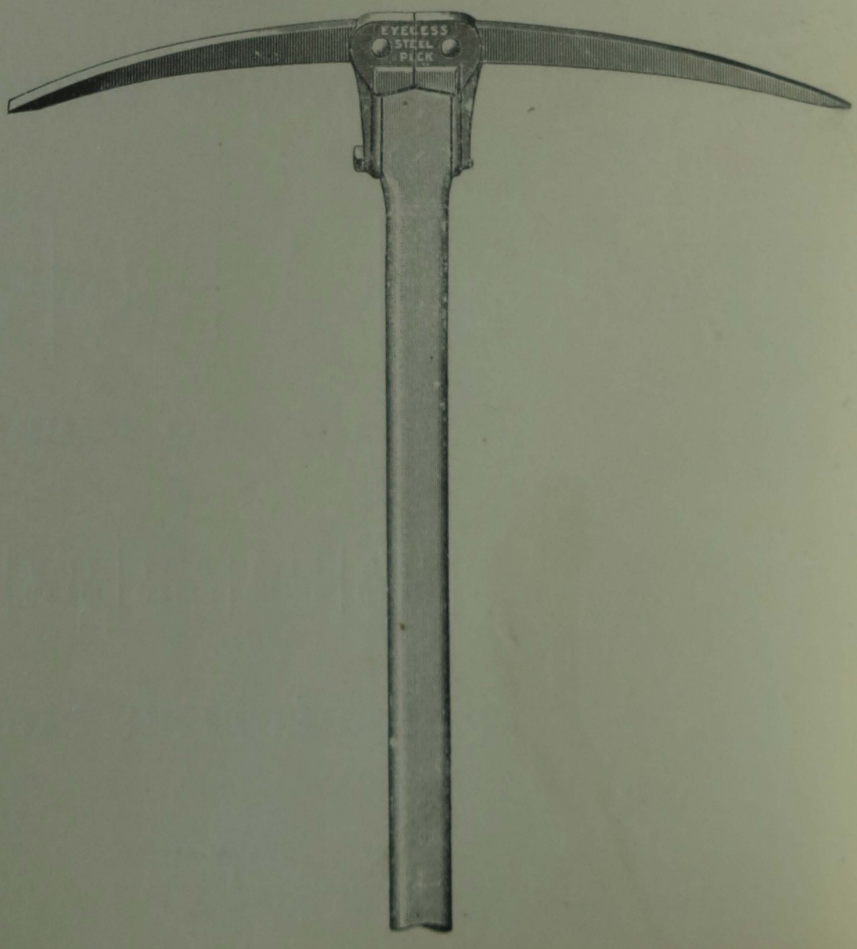
LIST.

Numbers.	Weight. Pounds.	Ounces.	Price. Per dozen.
1	1		..... $15 00
2	1	8	..... 16 00



EYELESS STEEL PICKS.

Any old mining man will appreciate this pick at a glance. Handles are interchangeable and can be put in without trouble. Can be taken out to sharpen pick, and when it comes to packing for prospecting purposes, they are the only pick to have. A wrench, small enough to go in the pocket, is sent with each pick, and it is scarcely a minute's work to have pick in shape to use. Aside from its convenience, it is stronger than the ordinary pick, as it is an admitted fact that the eye is the weakest part and liable to spread when pick is striking hard substances.



LIST.

	Per Doz.
1¾ to 3 pounds	$12 00
4 pounds	14 00
5 pounds	16 00
6 pounds	18 00
7 pounds—Standard	20 00
8 pounds—Standard	22 00
7 pounds—Tamping	24 00
8 pounds—Tamping	26 00

Above prices include Handles.

Handles, per dozen.....$ .....

HANDLES.

HAND SHAVED AXE HANDLES.

Octagon and Oval. Single Bitted.

LIST.

Length.		XXX	XX	X
34 and 36 inches, Scroll End	Per dozen,	$4 00	$3 50	$2 50
34 and 36 inches, Plain End	Per dozen,	3 50	3 00	2 20
32 inches, Plain End	Per dozen,	3 50	3 00	2 20
38 inches, Plain End	Per dozen,	3 75	3 00	2 20
40 inches, Plain End	Per dozen,	4 00	3 50	2 30

TURNED POLISHED AXE HANDLES.

Double Bitted.

LIST.

Length.		Extra.	Excelsior.	No. 1.
30, 32, 34 and 36 inches	Per dozen,	$3 20	$2 50	$2 00
38 inches	Per dozen,	3 50	2 70	2 00
40 inches	Per dozen,	3 70	3 00	2 00
42 inches	Per dozen,	4 20	3 20	2 00
44 inches	Per dozen,	5 00	3 50	2 00

HAND SHAVED AXE HANDLES.

Octagon and Oval. Double Bitted.

LIST.

Length.		XXX	XX	X
34 and 36 inches, Plain End	Per dozen,	$3 50	$3 00	$2 20
32 inches Plain, End	Per dozen,	3 50	3 00	2 20
38 inches Plain, End	Per dozen,	3 75	3 00	2 20
40 inches Plain, End	Per dozen,	4 00	3 50	2 30

POLISHED CARPENTER ADZE HANDLES.

LIST.

Length.		Extra.	Excelsior.	No. 1.
32 and 34 inches	Per dozen,	$4 00	$3 50	$2 00

RAILROAD PICK AND MATTOCK HANDLES.

LIST.

Length.		Extra.	Excelsior.	No. 1.	No. 2.	No.
36 inches	Per dozen,	$4 50	$3 50	$2 50	$1 70	$1 30

DRIFTING PICK HANDLES.

LIST.

Length.		Extra.	Excelsior.	No. 1.
32, 34 and 36 inches	Per dozen,	$3 50	$3 00	$2 00

Hand Shaved Drifting Pick Handles, add 45 cents per dozen to price of Turned.

HANDLES---Continued.

COAL MINERS' PICK HANDLES.

LIST.

Numbers.		Eye. Inches.	Length. Inches.	Extra. Per dozen.	Excelsior. Per dozen.	No. 1. Per dozen.
1	Small pattern	3 x 5/8	34	$2 00	$1 60	$1 40
2	Medium	3 x 3/4	34	2 00	1 60	1 40
3	Large	3 1/8 x 7/8	34	2 00	1 60	1 40

SLEDGE HANDLES.

LIST.

Length.		Extra.	No. 1.	No. 2.
24 and 26 inches	Per dozen,	$1 25	$1 00	$ 75
28 and 30 inches	Per dozen,	1 60	1 25	1 00
32 inches	Per dozen,	1 75	1 40	1 10
34 and 36 inches	Per dozen,	2 00	1 60	1 20
38 inches	Per dozen,	2 25	1 70	1 35
40 inches	Per dozen,	2 50	2 00	1 60

Hand Shaved Sledge, add 40 cents per dozen to above prices.

MACHINIST HAMMER HANDLES.

LIST.

Length.....Inches	11	12	13	14	15	16	17	18	19	20	22	24
Per dozen.....	$0 60	$0 60	$0 60	$0 60	$0 60	$0 65	$0 70	$0 80	$0 85	$9 00	$0 95	$1 05

STONE MASON HAMMER HANDLES.

LIST.

Length.....Inches	11	12	13	14	15	16	17	18	19	20	22	24
Per dozen.....	$0 60	$0 60	$0 60	$0 60	$0 60	$0 65	$0 70	$0 80	$0 85	$0 90	$0 95	$1 05

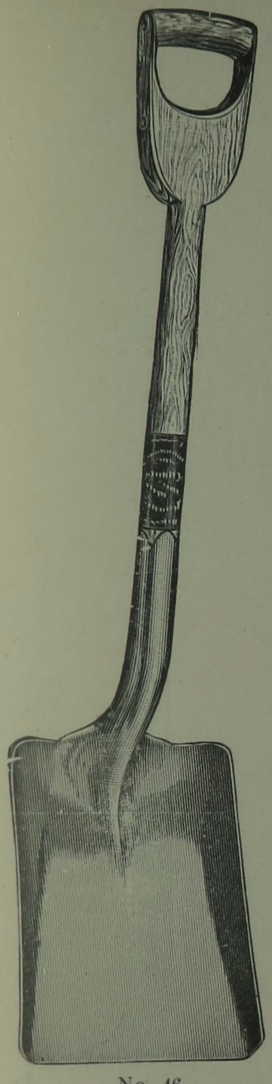
MAUL HANDLES.

LIST.

Length.		Extra.	No. 1.	No. 2.
24 and 26 inches	Per dozen,	$1 25	$1 00	$ 75
28 and 30 inches	Per dozen,	1 60	1 25	1 00
32 inches	Per dozen,	1 75	1 40	1 10
34 and 36 inches	Per dozen,	2 00	1 60	1 20
38 inches	Per dozen,	2 25	1 70	1 35
40 inches	Per dozen,	2 50	2 00	1 60

Hand Shaved Maul, add 40 cents per dozen to above prices.

ALL OF OUR HANDLES ARE SELECTED HICKORY.

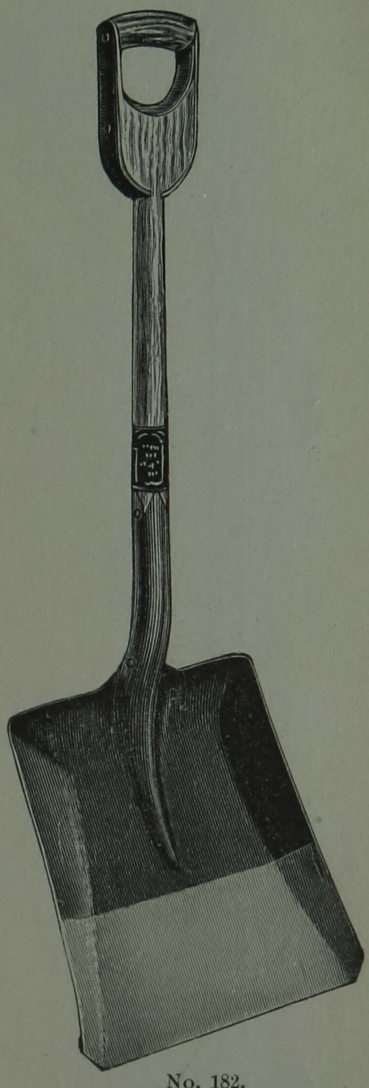


No. 46

CHISHOLM'S SOLID CAST STEEL SOCKET SHOVELS.

WARRANTED.

LIST.



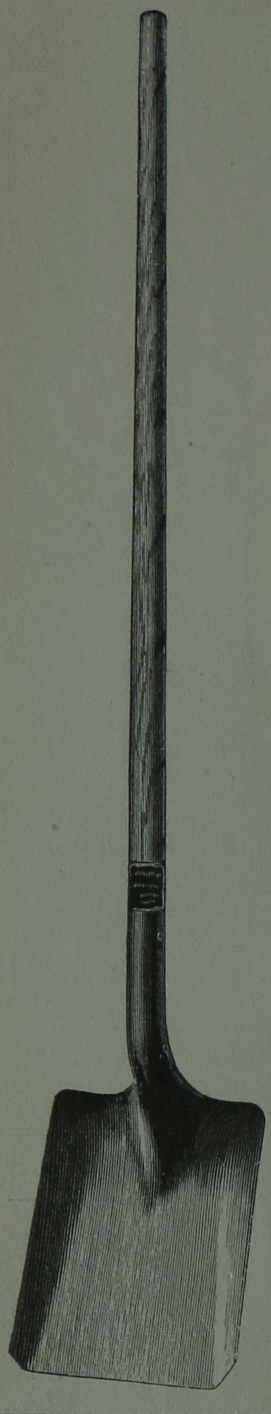
No. 182.

DESCRIPTION.	Numbers.	Size.	Price.
D Handle, Square Point, Black	40	2	$14 00
D Handle, Square Point, Black	41	3	15 00
D Handle, Square Point, Black	42	4	16 00
D Handle, Square Point, Black	43	5	17 00
D Handle, Square Point, Black	44	6	18 00
D Handle, Square Point, Black	45	8	20 00
D Handle, Square Point, Polished	46	2	22 00

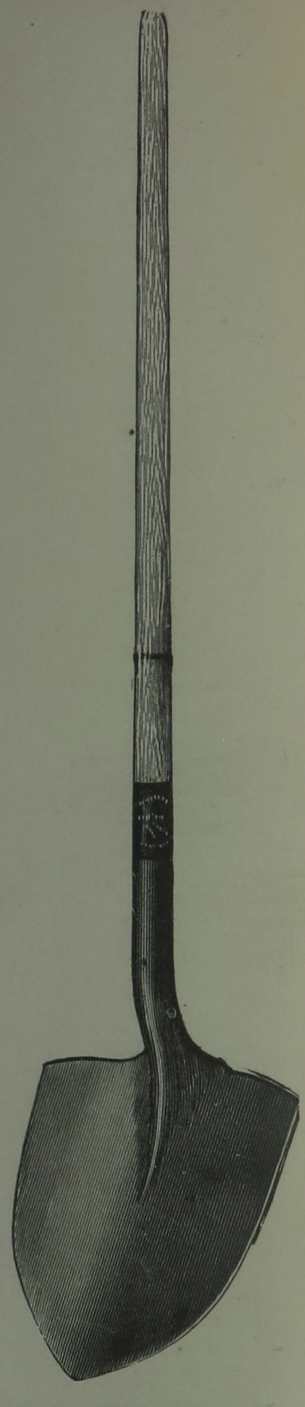
SOLID CAST STEEL COAL SHOVELS.

LIST.

DESCRIPTION.	Numbers.	Size.	Price.
D, or Long Handle, Black	171	1	$15 75
D, or Long Handle, Black	172	2	16 75
D, or Long Handle, Black	173	3	18 50
D, or Long Handle, Black, Coke	175	5	22 00
D, or Long Handle, Half Polished	181	1	16 25
D, or Long Handle, Half Polished	182	2	17 25
D, or Long Handle, Half Polished, Coke	183	3	19 00
D, or Long Handle, Half Polished	185	5	22 50



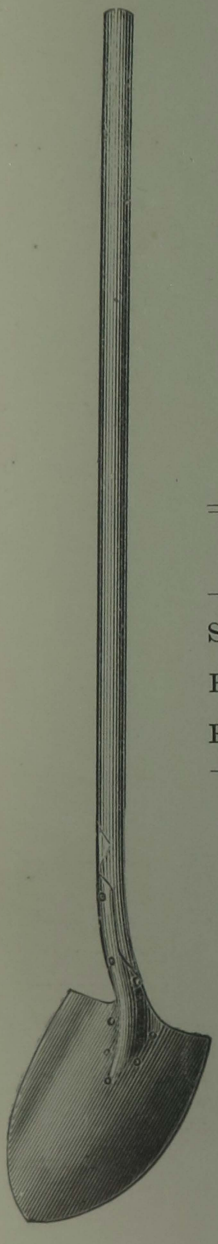
CHISHOLM
SOLID CAST STEEL
SOCKET SHOVELS.

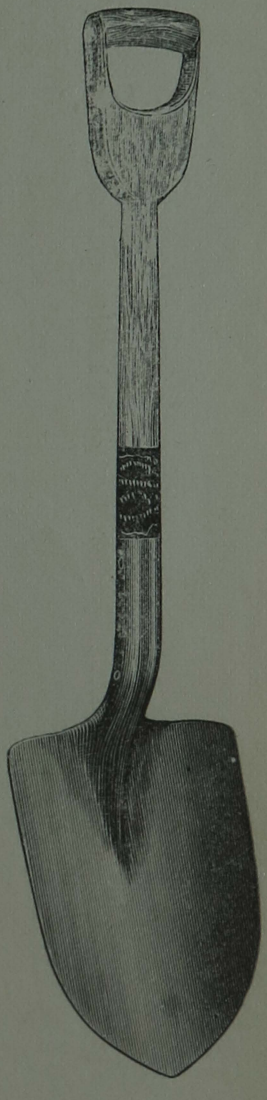


LIST.

DESCRIPTION.	"STAR."			"SUPERIOR."		
	Numbers.	Size.	Price.	Numbers.	Size.	Price.
Long Handle, Square Point, Black	53	2	$14 00	053	2	13 00
Long Handle, Square Point, Black	54	3	15 00	054	3	14 00
Long Handle, Square Point, Black	55	4	16 00	055	4	15 00
Long Handle, Square Point, Black	56	5	17 00	056	5	16 00
Long Handle, Square Point, Black	57	6	18 00	057	6	17 00
Long Handle, Square Point, Black	58	8	20 00	058	8	19 00
Long Handle, Square Point, Polished	59	2	.....	059	2	.....
Long Handle, Square Point, Polished	60	3	.....	061	2	.....
Long Handle, Round Point, Black	61	2	14 00	064	2	14 00
Long Handle, Round Point, Black	63	3	.....	....	..	.....
Long Handle, Round Point, Black, Western Pat.	62	2	.....	....	..	.....
Long Handle, Round Point, Polished	64	2	15 00	....	..	.....
Long Handle, Round Point, Polished	66	3	.....	....	..	.....
Long Handle, Round Point, Polished, West. Pat.	65	2	.....	....	..	.....

CHISHOLM MINING SHOVELS.





LONG HANDLE.

LIST.

DESCRIPTION.	Numbers.	Size.	Price.
Spring or Stiff.....	194	2	$12 15
Half Spring.....	195	2	12 15
Full Spring	196	2	12 15

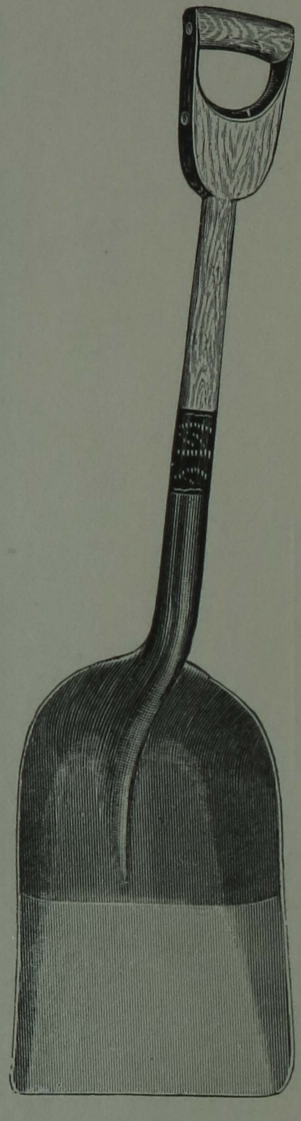
D HANDLE.

LIST.

DESCRIPTION.	Numbers.	Size.	Price.
Round Point.....	47	3	.. ....
Round Point	67	2	$14 75
Round Point.....	70	2	15 75

CHISHOLM SOLID CAST STEEL SCOOPS.

THICK CENTER, WARRANTED.



LIST.

DESCRIPTION.	Numbers.	Size.	Price.	DESCRIPTION.	Numbers.	Size.	Price.
D, or Long Handle, Black...	82	2	$14 25	D, or Long Handle, Black...	134	4	.....
D, or Long Handle, Black...	83	3	15 00	D, or Long Handle, Black...	135	5	19 50
D, or Long Handle, Black...	84	4	15 75	D, or Long Handle, Black...	136	6	.....
D, or Long Handle, Black...	85	5	16 75	D, or Long Handle, Black...	137	7	.....
D, or Long Handle, Black...	86	6	17 50	D, or Long Handle, Black...	138	8	22 25
D, or Long Handle, Black...	87	7	18 25	.....	....	..	.....
D, or Long Handle, Black...	88	8	.....	.....	....	..	.....

CHISHOLM SOLID CAST STEEL SCOOPS.

PLAIN OR UNIFORM GAUGE—EASTERN PATTERN.

"SUPERIOR."

LIST.

DESCRIPTION.	Numbers.	Size.	Price.
D, or Long Handle, Black	082	2	$13 25
D, or Long Handle, Black	083	3	14 00
D, or Long Handle, Black	084	4	14 75
D, or Long Handle, Black	085	5	15 75
D, or Long Handle, Black	086	6	16 50
D, or Long Handle, Black	087	7	17 25
D, or Long Handle, Black	088	8	.....
D, or Long Handle, Black	0134	4	.....
D, or Long Handle, Black	0135	5	.....
D, or Long Handle, Black	0136	6	.....
D, or Long Handle, Black	0137	7	.....
D, or Long Handle, Black	0138	8	.....
D, or Long Handle, Black	0140	10	.....
D, or Long Handle, Black	0142	12	22 75
D, or Long Handle, Half Polished	0144	4	.....
D, or Long Handle, Half Polished	0145	5	16 25
D, or Long Handle, Half Polished	0146	6	.....
D, or Long Handle, Half Polished	0147	7	.....
D, or Long Handle, Half Polished	0148	8	.....
D, or Long Handle, Half Polished	0150	10	21 75
D, or Long Handle, Half Polished	0152	12	23 25
D, or Long Handle, Full Polished	0154	4	.....
D, or Long Handle, Full Polished	0155	5	.....
D, or Long Handle, Full Polished	0156	6	.....
D, or Long Handle, Full Polished	0157	7	.....
D, or Long Handle, Full Polished	0158	8	.....
D, or Long Handle, Full Polished	0160	10	22 75
D, or Long Handle, Full Polished	0162	12	.....

GAS TOOLS.

CHARGING SCOOPS.

LIST.

DESCRIPTION.	Numbers.	Size.	Price.
D Handle, Half Polished	163	3	.....
D Handle, Half Polished	164	4	.....
D Handle, Half Polished	165	5	.....

FIRING SCOOPS.

LIST.

DESCRIPTION.	Number.	Size.	Price.
D Handle, Black	166	2	.....

ASH PAN SCOOP BLADES.

FOR ADJUSTABLE HANDLES.

LIST.

DESCRIPTION.	Number.	Size.	Price.
For Long Handle, Black	167	2	.....

DIMENSIONS OF SHOVELS.

Square Point	No. 2, D, or Long Handle	9½ inches wide	11¾ inches long
Square Point	No. 3, D, or Long Handle	10¼ inches wide	12½ inches long
Square Point	No. 4, D, or Long Handle	10⅞ inches wide	13⅛ inches long
Square Point	No. 5, D, or Long Handle	11⅜ inches wide	13½ inches long
Square Point	No. 6, D, or Long Handle	12 inches wide	14 inches long
Square Point	No. 8, D, or Long Handle	12½ inches wide	14¾ inches long
Round Point	No. 2, D Handle	9¼ inches wide	13 inches long
Round Point	No. 2, D, or Long Handle	9½ inches wide	12 inches long
Round Point	No. 3, D, or Long Handle	10¾ inches wide	12½ inches long

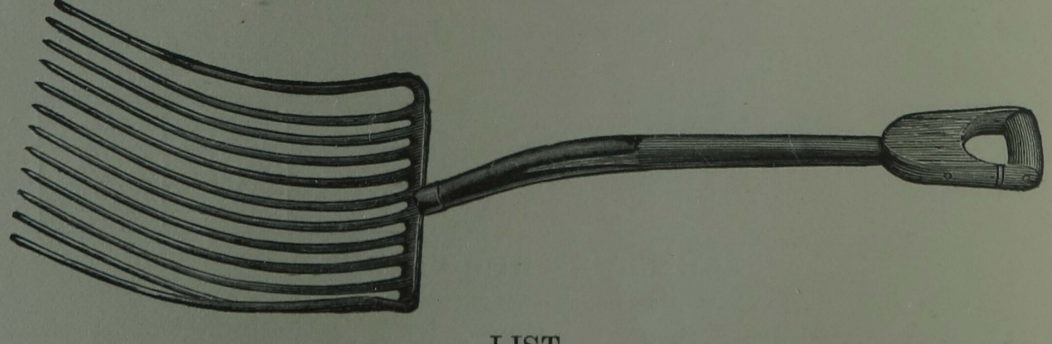
COAL SHOVELS.

No. 1,	13½ inches wide	13¾ inches long
No. 2,	14¼ inches wide	14¾ inches long
No. 3,	14¾ inches wide	15¼ inches long
No. 5, Coke	15 inches wide	17 inches long
No. 6, Round Point	12¾ inches wide	14 inches long
No. 7, Round Point	11½ inches wide	15¾ inches long

SCOOPS.

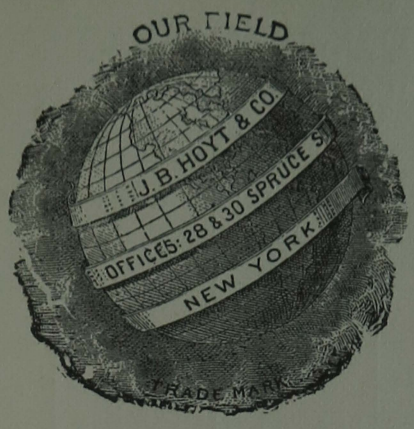
No. 2, Eastern Pattern	11 inches wide	15 inches long
No. 3, Eastern Pattern	11¼ inches wide	15½ inches long
No. 4, Eastern Pattern	11½ inches wide	16 inches long
No. 5, Eastern Pattern	12 inches wide	16½ inches long
No. 6, Eastern Pattern	12¼ inches wide	17 inches long
No. 7, Eastern Pattern	13¼ inches wide	17 inches long
No. 8, Eastern Pattern	13½ inches wide	17¼ inches long
No. 4, Western Pattern	12½ inches wide	15½ inches long
No. 5, Western Pattern	13½ inches wide	16 inches long
No. 6, Western Pattern	13½ inches wide	16½ inches long
No. 7, Western Pattern	13⅞ inches wide	17 inches long
No. 8, Western Pattern	14¼ inches wide	17½ inches long
No. 10, Western Pattern	15 inches wide	18¾ inches long
No. 12, Western Pattern	15½ inches wide	19½ inches long

COKE FORKS.



LIST.

No. of Tines.	Shape of Tines.	Style of Handle.	Price per dozen.
12	Diamond, Strapped Ferrule	D	$28 00
14	Diamond, Strapped Ferrule	D	33 00
16	Diamond, Strapped Ferrule	D	40 00



LEATHER BELTING.

HOYT'S SHORT LAP PURE OAK-TANNED.

Our Belts are made from pure oak-tanned butts, and of the heart or solid part only. No part of the shoulder is used. Any one not familiar with belt making can readily detect this by the shortness of the lengths and laps. Long laps are made including the shoulder or thinner and softer part of the leather, causing the belt to be, in its enduring qualities, no better than its poorest or thinnest parts.

Our Belting is warranted to run straight and maintain an even bearing on the pulleys, and is sold under the fullest guarantees.

LIST.

Width. Inches.	Per Running Foot.	Width. Inches.	Per Running Foot.
1	$ 12	13	$ 2 00
1¼	16	14	2 20
1½	20	15	2 40
1¾	24	16	2 60
2	28	17	2 80
2¼	32	18	3 00
2½	36	19	3 20
2¾	40	20	3 40
3	44	21	3 60
3½	52	22	3 80
4	60	24	4 20
4½	68	25	4 40
5	76	26	4 60
5½	84	28	5 00
6	92	30	5 50
6½	1 00	32	6 00
7	1 08	34	6 50
8	1 24	36	7 00
9	1 40	40	7 80
10	1 56	50	9 80
11	1 72	60	11 80
12	1 88	72	14 40

Double Leather Belt Twice the Price of Single.

ROUND BELT.

TWIST. Inches.	Per Foot.	TWIST. Inches.	Per Foot.	SOLID. Inches.	Per Foot.
1/8	$0 06	1/2	$0 30	1/8	$.....
3/16	10	5/8	36	3/16	.....
1/4	14	3/4	46	1/4	.....
5/16	18	7/8	60	5/16	.....
3/8	22	1	72	3/8	.....

CUT LACE.

Width. Inches.	Per 100 Feet.	Width. Inches.	Per 100 feet.
1/4	$1 00	1/2	$2 00
7/16	1 25	5/8	2 75
3/8	1 50	3/4	3 25
7/16	1 75		

Rawhide Lace Leather, per square foot..... $0 30

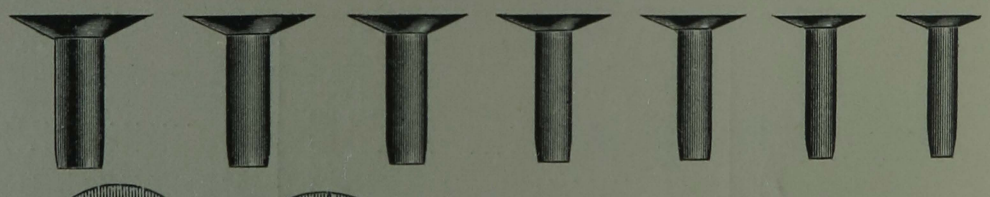
Belt Cement, 1-lb cans, price..... $1 25

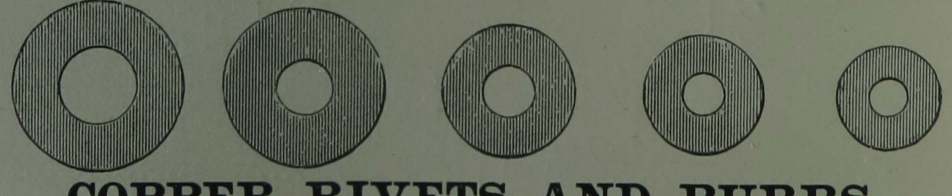
RUBBER BELTING.

"GIANT." "GRANITE." "BEACON."

LIST.

Inches.	2-Ply.	3-Ply.	4-Ply.	5-Ply.	6-Ply.	7-Ply.	8-Ply.
1	$0 07	$0 09	$0 11	.....	.....	.....	.....
1¼	09	11	13	.....	.....	.....	.....
1½	11	13	15	$0 19	.....	.....	.....
1¾	13	15	17	21	.....	.....	.....
2	15	17	21	26	$0 31	.....	.....
2½	18	22	26	32	39	.....	.....
3	22	26	31	38	46	.....	.....
3½	26	30	37	46	55	.....	.....
4	30	34	42	52	63	$0 73	.....
4½	33	39	47	58	70	82	.....
5	36	43	52	65	78	91	.....
6	43	52	62	77	93	1 08	$1 24
7	51	60	73	91	1 09	1 27	1 46
8	59	70	84	1 05	1 26	1 47	1 68
9	67	80	95	1 18	1 42	1 66	1 90
10	75	90	1 07	1 33	1 60	1 87	2 14
11	83	1 00	1 18	1 47	1 77	2 06	2 36
12	91	1 08	1 30	1 62	1 95	2 27	2 60
13	1 00	1 18	1 42	1 77	2 13	2 48	2 84
14	1 08	1 28	1 54	1 92	2 31	2 69	3 08
15	1 16	1 38	1 66	2 07	2 49	2 90	3 32
16	1 25	1 50	1 78	2 22	2 67	3 11	3 56
18	1 41	1 70	2 02	2 52	3 03	3 53	4 04
20	1 58	1 90	2 26	2 82	3 39	3 95	4 52
22	1 76	2 12	2 52	3 15	3 78	4 41	5 04
24	1 96	2 36	2 80	3 50	4 20	4 90	5 60
26	2 16	2 60	3 08	3 85	4 62	5 39	6 16
28	2 36	2 84	3 36	4 20	5 04	5 88	6 72
30	.....	.....	3 64	4 55	5 46	6 37	7 28
32	.....	.....	3 92	4 90	5 88	6 86	7 84
34	.....	.....	4 20	5 25	6 30	7 35	8 40
36	.....	.....	4 48	5 60	6 72	7 84	8 96
38	.....	.....	4 76	5 95	7 14	8 33	9 52
40	.....	.....	5 04	6 30	7 56	8 82	10 08
42	.....	.....	5 32	6 65	7 98	9 31	10 64
44	.....	.....	5 60	7 00	8 40	9 80	11 20
46	.....	.....	5 88	7 35	8 82	10 29	11 76
48	.....	.....	6 16	7 70	9 24	10 78	12 32
50	.....	.....	6 44	8 05	9 66	11 27	12 88
52	.....	.....	6 72	8 40	10 08	11 76	13 44
54	.....	.....	7 00	8 75	10 50	12 25	14 00
56	.....	.....	7 28	9 10	10 92	12 74	14 56
58	.....	.....	7 56	9 45	11 34	13 23	15 12
60	.....	.....	7 84	9 80	11 76	13 72	15 68



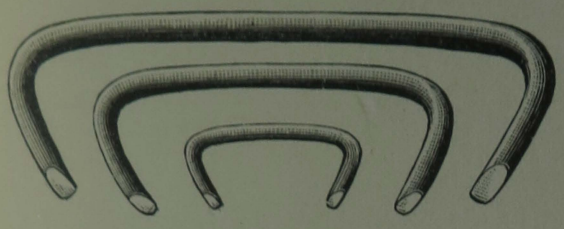


COPPER RIVETS AND BURRS.

Numbers	7	8	9	10	11	12	13	14	15
Price ....Per Pound,	$0 50	$0 50	$0 52	$0 54	$0 56	$0 58	$0 60	$0 65	$0 70

OVAL POINT BELT HOOKS.

LIST.

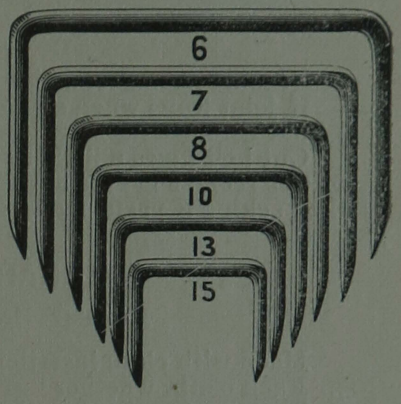


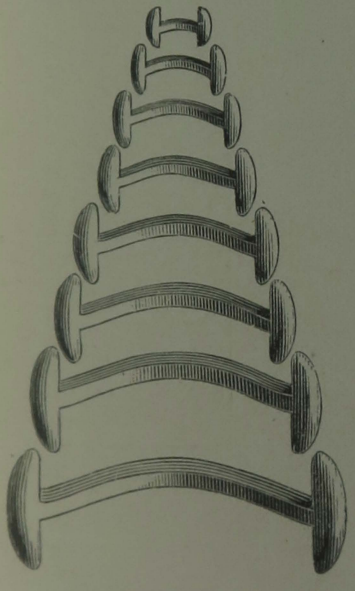
Numbers	1	2	3	4	5
Price ...Per M.	$30 00	20 00	16 00	14 00	11 00
Numbers	6	7	8	9	10
Price ..... Per M.	$ 8 50	6 00	5 00	4 00	3 50
Numbers	11	12	13	14	15
Price .. .Per M.	$ 3 00	2 80	2 60	2 40	2 00

BUFFALO BELT FASTENERS.

LIST.

Numbers	15	13	10	8	7	6
Number in a Box ...	200	200	200	200	200	200
Price ....Per M.	$ 1 50	2 00	2 50	3 50	4 00	5 00





BLAKE'S PATENT BELT STUDS.

BENT PATTERN.

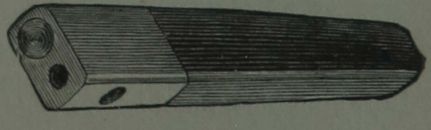
LIST.

Numbers	6	5	4	3
Price ....Per box	$ 0 60	0 70	0 80	0 90
Numbers	2	1	0	00
Price ....Per box	$ 1 25	1 65	2 00	2 50

RIVET SETS AND HEADS.

LIST.

Numbers	7 and 8	0 and 00	1 and 2	3 and 4
Price .....Per dozen.	$ 5 00	9 00	7 50	6 00
Adapted to Copper Rivet.	.....	6	7	8



BELT PUNCHES.

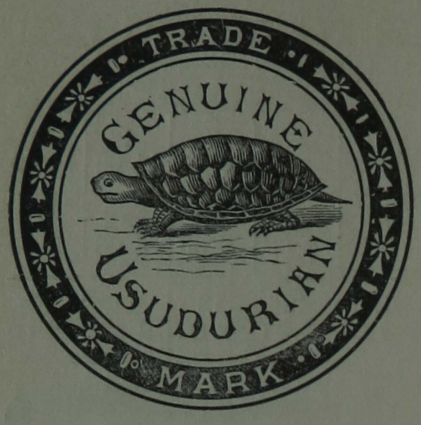
LIST.

Numbers 1, 2, 3, 4, 5, Best Cast Steel.....Per dozen, $ 2 00
Numbers 6, 7, 8, 9, Best Cast Steel.....Per dozen, 2 25
Numbers 10, 12, 14, Best Cast Steel.....Per dozen, 2 50

LATHROP'S PATENT BELT AWLS.

LIST.

Price.....Per dozen, $ 9 00



SHEET PACKING.

STEAM.

LIST.

Sheet.....Per pound, $0 80
Gaskets, Rings, etc.....Per pound, 95

Kept on hand in sheets $\frac{1}{64}$, $\frac{1}{32}$, $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$, $\frac{3}{16}$ and $\frac{1}{4}$ inch thick. All sizes of Gaskets, Rings, etc., furnished on receipt of order.

DIRECTIONS.—Screw tight when cold.

If joint leaks when steam is let on, screw up till leak stops, but no more than is necessary to stop leak.

Cut bolt-holes a little less than the diameter of bolts; as this packing is not vulcanized, it will be soft as soon as heat is applied, but soon becomes hard. In order to break joints, apply to one side of the packing a paste made of black lead and water; chalk or paper will also answer the same purpose.

"GRANITE," "SHAWMUT" AND "HARLEM."

Regular Brands. For Steam Joints and Weather Strips.

Made with cloth insertion, cloth one side or both sides.
Each cloth, whether insertion or on outside, to count as one ply.
There is one ply of cloth to every $\frac{1}{16}$-inch thichness.

LIST.

Thickness. Inch.	1-Ply.	2-Ply.	3-Ply.	4-Ply.
$\frac{1}{64}$	$ 0 70	.....	.....	.....
$\frac{2}{32}$	65	.....	.....	.....
$\frac{1}{16}$	60	$ 0 63	$ 0 66	.....
$\frac{3}{32}$	55	58	61	.....
$\frac{1}{8}$	.....	55	58	$ 0 61
$\frac{3}{16}$	.....	.....	55	58
$\frac{1}{4}$	.....	.....	.....	55

Three cents per pound additional will be charged for each extra ply of cloth.

"GIANT RED."

LIST.

Sheet.....Per pound, $0 80
Gaskets, Rings, etc.....Per pound, 95

Joints should be faced with plumbago or lamp-black; thus prepared this packing can be taken out and replaced repeatedly.

We carry in stock a full line of sheet packing from $\frac{1}{64}$ to $\frac{1}{4}$ inch thick.

Man-hole, hand-hole, flange and ring gaskets and bibb-washers made to order on short notice.

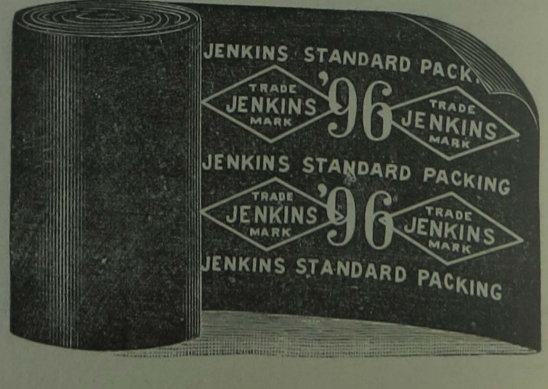
JENKINS PACKING.

UNVULCANIZED.

Joints made and in use twenty years, under eventy to eighty pounds steam pressure, as good to-day as when first made.

LIST.

Standard.....Per pound, $0 80
Jenkins '96.....Per pound, 80



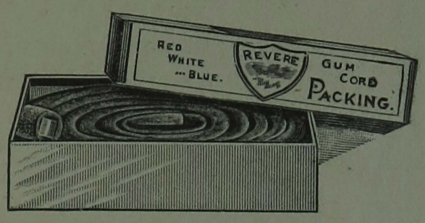
SHEET PACKING---Continued.

LIST.

Pure Gum	Per pound,	$1 40
Rainbow	Per pound,	1 00
Blue Blood	Per pound,	1 00

PISTON PACKING.

GUM CORE---FLAX.

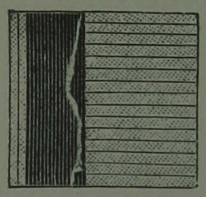


LIST.

"Revere," Red, White and Blue—Flat Core	$1 00
"Beacon," Red, White and Blue—Flat Core	1 00
"Mohawk," Red, White and Blue—Round Core	1 00
"Keystone," Cotton—Plumbago, FlatCore	1 00

Put up in 5-pound boxes, or 25-pound bales or reels.

"SHAWMUT"---RUBBER BACK.



End View.

Price ..... Per pound, $1 00

Made in 20-foot lengths.

"GRANITE" AND "HARLEM"---ROUND AND SQUARE.

(TUCK'S.)

For packing the Piston Rods and Valve Stems of Steam Engines and Pumps.

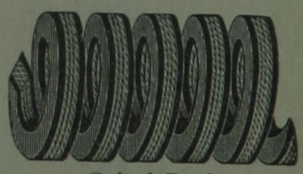
Price ..... Per pound, $0 85

Made in 12-foot lengths.

GARLOCK PACKING.

Sectional Ring Packing.

Elastic Ring Packing.

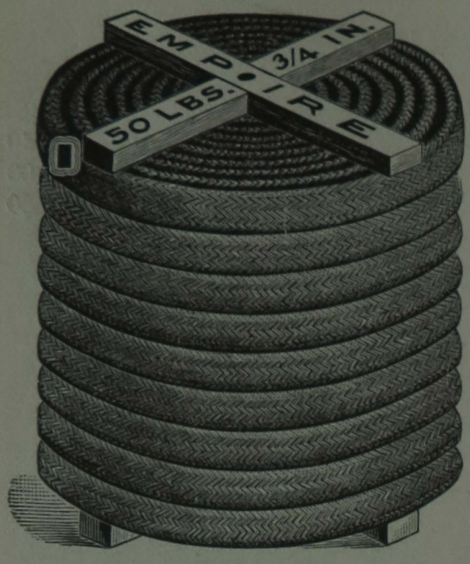


Spiral Packing.

Price, all varieties ..... Per pound, $1 20

LIST.

Diamond	Per pound,	$1 00
Peerless	Per pound,	1 00
Eureka	Per pound,	1 00
Phoenix	Per pound,	80
Perfection	Per pound,	80
Soapstone	Per pound,	25



PISTON PACKING---Continued.

EMPIRE PACKING.

Centre of pure rubber; also made round, with a round core.

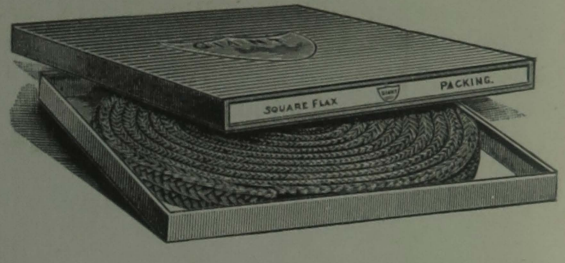
Put up on reels or in coils of 25 to 100 pounds weight.

Price.....Per pound, $1 00

SQUARE FLAX.

This packing is braided square from best quality flax roving, and is treated with lubricating compound, which, combined with the solid square braid, gives a perfect packing for water or steam.

Put up in boxes. Weights approximately as below.



LIST.

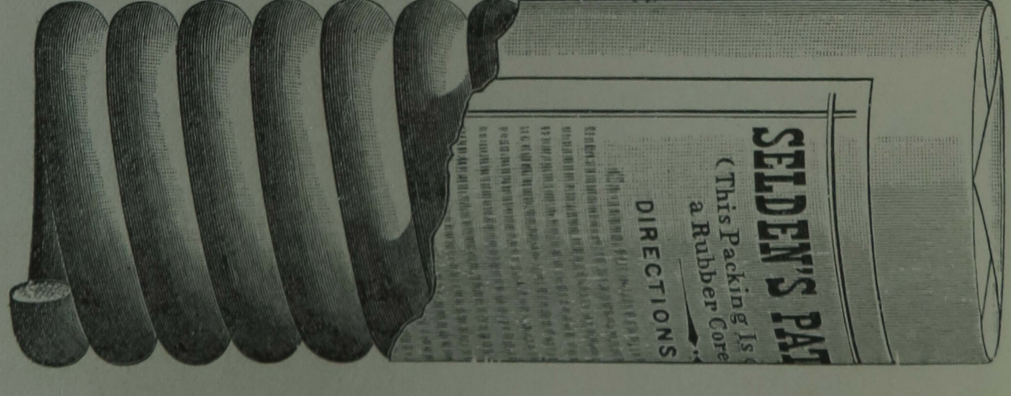
¼ inch, 6 pounds.	½ inch, 7 pounds.	¾ inch, 6¾ pounds.	1 inch, 10½ pounds
⅜ inch, 5½ pounds.	⅝ inch, 6 pounds.	⅞ inch, 9 pounds.	1 ¼ inch, 8 pounds

Price.....Per pound, $1 00
Treated with Plumbago.....Per pound, 1 00

HEMP PACKING.

LIST.

Italian Hemp Packing, "A".....$0 25
Italian Hemp Packing, "B".....20
Italian Hemp Packing, Tallowed.....30

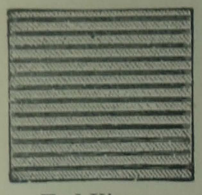


SELDEN'S PATENT PACKING.

LIST.

Round Rubber Core, ¼ to 2 inches.....Per pound, $0 60
Canvass Core, ¼ to 2 inches.....Per pound, 50

PISTON PACKING---Continued.



End View.

"GIANT" AND "SHAWMUT."

Fine Square Pump Packing.

We make to order for steam pumps a square packing, using fine duck and white rubber.

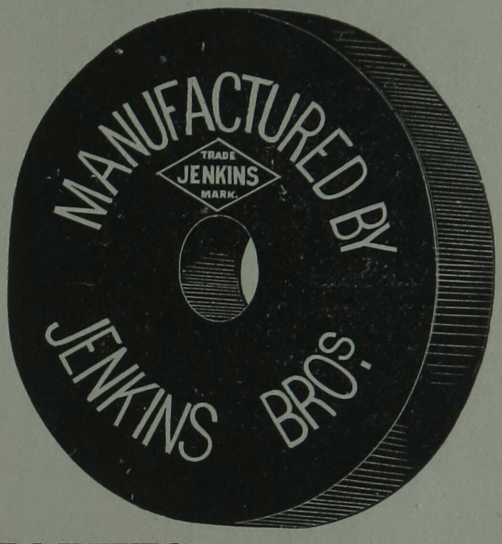
Price.....Per pound, $1 00

Made in 12-foot lengths.

GOODSELL RUBBER BACK.

Price.....Per pound, $1 50

JENKINS PUMP VALVES.



These Valves are especially adapted for pumping hot water, syrups, beer and other destructive fluids; also muddy and gritty water. When Rubber Valves have been found useless, these Valves have given entire satisfaction. For mining and high pressure service, Jenkins Bros. No. 88 Pump Valves are in use on 450 pounds pressure, and are giving entire satisfaction.

In ordering Pump Valves, give diameter, thickness and size of hole.

Price.....Per pound, $1 50

RUBBER PUMP VALVES.

As the efficiency of all pumps largely depends upon the valves, we devote special attention to this article.

"Giant Red," for warm water and condensers, is a soft stock.
"Revere Hard," for hot water, is a hard stock.
"Little Giant," for cold water, heavy lift.
"Revere," for cold water, light lift.
"P. & R.," for either hot (medium temperature) or cold water and any lift—will also stand the action of oils.

Hot water valves are generally of hard rubber. Cold water valves are of soft or medium quality --soft for light lifts and harder as the work increases or if the water is gritty.

Valves of any shape and size.....Per pound, $1 50

GASKETS.

"GRANITE" "SHAWMUT."

Cloth Insertion—Spliced or Moulded.

LIST.

Regular sizes and thicknesses	Per pound,	$1 00
Thin sizes ($\frac{1}{16}$-inch or less)	Per pound,	1 25

Mixed—Spliced or Moulded.

Regular sizes and thicknesses	Per pound,	75
Thin sizes ($\frac{1}{8}$ inch or less)	Per pound,	1 00
Red Crescent Tubular	Per pound,	1 00

Special orders for Gaskets, Rings, etc., of any size or pattern that we do not keep on hand, can be executed within one week from receipt of order.

GAUGE GLASS WASHERS.

LIST.

	Square.	Round.	Per dozen.
1 Gross, $\frac{1}{2}$ inch	14 ounces	10½ ounces	$1 50
1 Gross, $\frac{5}{8}$ inch	16 ounces	11 ounces	1 75
1 Gross, $\frac{3}{4}$ inch	18½ ounces	13 ounces	2 00

Round, half round and square.

WATER HOSE.

"GIANT." "GRANITE." "BEACON."

LIST.

Internal Diameter. Inches.	Conducting Hose. 2-Ply. Per Foot.	Hydrant Hose. 3-Ply. Per Foot.	Engine Hose. 4-Ply. Per Foot.	Engine Hose. 5-Ply. Per Foot.
½	$ 20	$ 25	$ 30	$ 37
¾	25	30	37	46
1	33	40	50	62
1¼	42	50	62	77
1½	50	60	75	93
1¾	58	70	87	1 08
2	66	80	1 00	1 25
2¼	75	90	1 12	1 40
2½	83	1 00	1 25	1 56
2¾	92	1 10	1 37	1 71
3	99	1 20	1 50	1 87
4	Tank Hose for Railroads. 1 32	1 60	2 00	2 50
5	1 65	....	....	....
6	1 98	....	....	....
7	2 31	....	....	....
8	2 64	....	....	....
9	2 97	....	....	....
10	3 33	....	...	...

All intermediate sizes will be charged at the list price of the next larger size. Thus ⅞ inch will be charged at 1 inch price, etc. Five and 6-ply hose made at an advance of 25 and 50 per cent. respectively, on 4-ply prices.

STEAM HOSE.

"GIANT." "GRANITE." "BEACON."

LIST.

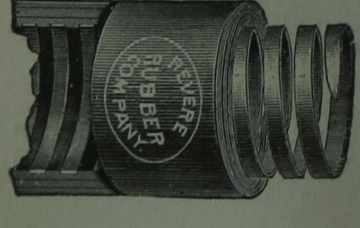
Internal Diameter. Inches.	3-Ply. For 20 Pounds Steam or less. Per Foot.	4-Ply. For 35 Pounds Steam or less. Per Foot.	5-Ply. For 50 Pounds Steam or less. Per Foot.	6-Ply. For 75 Pounds Steam or less. Per Foot.
½	$ 0 43	$ 0 51	$ 0 63	$ 0 76
¾	51	67	83	1 00
1	67	83	1 03	1 24
1¼	85	1 04	1 30	1 56
1½	1 02	1 25	1 56	1 87
1¾	1 18	1 45	1 81	2 17
2	1 34	1 66	2 07	2 49
2¼	1 50	1 87	2 33	2 80
2½	1 66	2 08	2 60	3 12
3	2 00	2 80	3 50	4 20

To obtain price on higher plies than given, add to the price given for 4-ply 25 per cent. for each additional ply.

SUCTION HOSE.

LIST.

Internal Diameter.	Per Foot.	Per Foot.
¾ inch.....	On spiral tinned iron wire, $ 70	On spiral brass wire, for light work, $ 77
1 inch.....	On spiral tinned iron wire, 90	On spiral brass wire, for light work, 1 00
1¼ inch..... ..	On spiral tinned iron wire, 1 15	On spiral brass wire, for light work, 1 25
1½ inch.....	On spiral tinned iron wire, 1 50	On spiral brass wire, for light work, 1 65
1¾ inch.....	On spiral tinned iron wire, 1 90	On spiral brass wire, for light work, 2 10
2 inch.....	On spiral tinned iron wire, 2 30	On spiral brass wire, for light work, 2 50



PLAIN BORE.

FOR EXCAVATING AND GENERAL WORK.

On Spiral, Flat, Galvanized Wire.

LIST.

Int. Diam.	Per Foot.	Int. Diam.	Per Foot.
2½ inch.....	$ 3 10	6 inch.....	$ 9 50
3 inch.....	4 00	7 inch.....	12 00
3½ inch.....	4 90	8 inch.....	15 00
4 inch.....	5 80	9 inch.....	17 50
4½ inch.....	6 70	10 inch.....	20 00
5 inch.....	7 60	12 inch.....	25 00
5½ inch.....	8 50	.....	

HARD RUBBER SUCTION HOSE.

FOUR PLY.

LIST.

Internal Diameter.	Price, Per Foot.
¾ inch	$0 65
1 inch	75
1¼ inch	93
1½ inch	1 13

FOR WINDING WATER HOSE WITH GRIP ROUND STEEL WIRE.

LIST.

	Price, Per Foot.			
	3-Ply.	4-Ply.	5-Ply.	6-Ply.
½ inch	$0 03	$0 04	$0 05	$ 06
¾ inch	04	05	06	07
1 inch	05	07	08	09
1¼ inch	07	08	09	10
1½ inch	08	09	10	11
1¾ inch	09	10	11	12
2 inch	10	11	12	13
2¼ inch	11	12	13	14
2½ inch	12	13	14	15

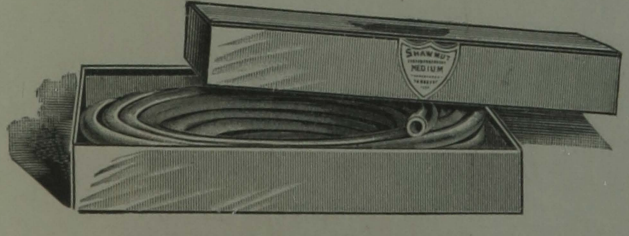
"BURRO" MILL HOSE.

Fine or Close Weave.

LIST.

Internal Diameter.	Price, Per Foot.
1 inch	$0 40
1½ inch	50
2 inch	60
2½ inch	70

We manufacture these grades of hose especially for fire protection in public buildings, factories, etc.

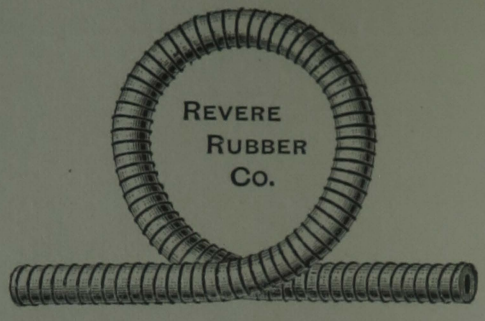


PURE TUBING.

"SHAWMUT."

LIST.

Internal Diameter.	Price, Per Foot.	Internal Diameter.	Price, Per Foot.
½ inch	$0 25	⅛ inch	$0 08
⅝ inch	30	3/16 inch	12
¾ inch	35	¼ inch	16
⅞ inch	40	5/16 inch	18
1 inch	45	⅜ inch	20



"STEEL ARMOR PROTECTED" HOSE.

(Registered Trade Mark.)

PERMANENT GRIP AIR DRILL HOSE.

LIST.

Size. Inches.	4-Ply. 3-ply inside and 1-ply outside. Per Foot.	5-Ply. 4-ply inside and 1-ply outside. Per Foot.	6-Ply. 5-ply inside and 1-ply outside. Per Foot.
¾	$ 67	$ 83	$1 00
1	83	1 03	1 24
1¼	1 04	1 30	1 56
1½	1 25	1 56	1 87
2	1 66	2 07	2 49
3			4 20

These brands of hose will stand from 1000 to 1500 pounds air pressure to the square inch. This hose can be canvas wrapped or specially wound with round or flat steel wire.

COTTON FIRE HOSE.

RUBBER LINED.

LIST.

2½ inches, per foot	$1 00
3 inches, per foot	1 40

The inside is knit weave. The strong warp and filling prevent twisting and elongation. The outside is woven, the weave being the square or basket weave, and gives a hard, strong wearing surface.

LINEN FIRE HOSE.

"REVERE UNDERWRITERS."

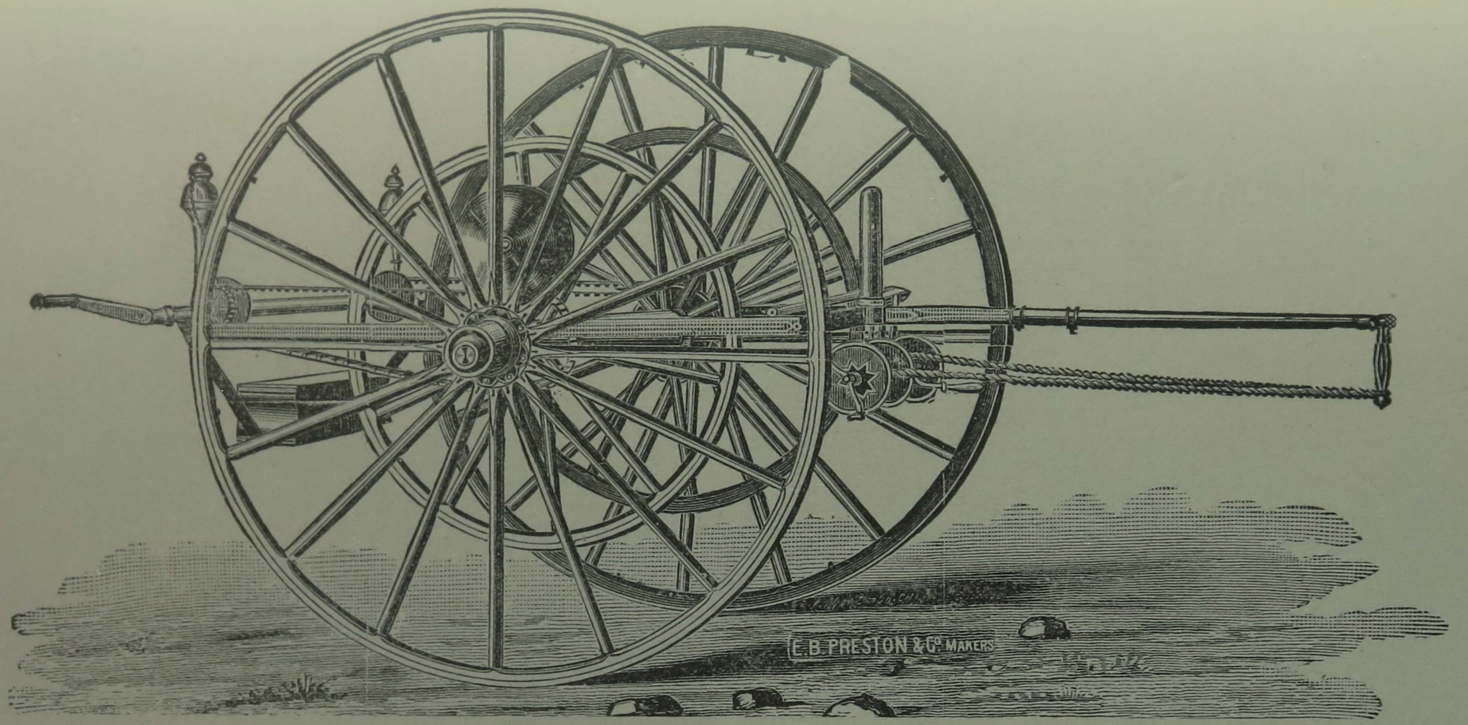
Designating lines, Yellow and Brown.

LIST.

	Price, Per Foot.
1 inch	$0 27
1¼ inch	30
1½ inch	33
2 inch	42
2¼ inch	46
2½ inch	50

In 50, 100, and 150-foot lengths.

Furnished rubber lined if desired, in 50-foot lengths only.



HAND HOSE JUMPERS.

LIST.

No. 1. The cut shows our regulation style of Hand Hose Cart, or, as it is commonly called, "Jumper," either for city or village use. The reel is operated by chain gear, and the gong struck automatically by the revolution of the wheel. It is built with 5½ or 6-foot wheels, as desired, and will carry from 500 to 700 feet of hose

The handsomest and most popular Jumber built. Equipped with fifty feet drag rope, rope reel, pipe-holder, one 12-inch automatic gong, one fire axe, one crowbar, tool box, wrenches, etc.; two solid brass torches, chain reel and crank, Sarven patent "A" wheels, Swede iron frame and forging, Concord axle. Painted English vermillion and gold striped. Weight 500 to 600 pounds.

Price $175 00

No. 2. This Jumper is reeled by hand, in place of the chain and crank, and is equipped with fifty feet of drag rope, rope reel, pipe holder, one 12 inch automatic gong, one fire axe, one crowbar, tool box, wrenches, etc.; two solid brass torches, Sarven patent "A" wheels, Swede iron frame and forging, Concord axle. Painted English vermillion and gold striped.

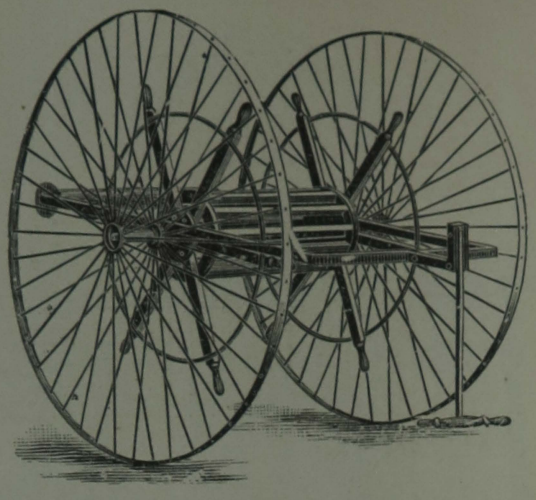
Price $160 00

No. 3. This Jumper is also reeled by hand, and is equipped with fifty feet of drag rope, rope reel, pipe holder, one 12-inch automatic gong, tool box, wrenches, etc.; Sarven patent "A" wheels, Swede iron frame and forging, Concord axle. Painted English vermilion, plainly striped.

Price $140 00

No. 4. This Jumper is also reeled by hand, and is equipped with fifty feet drag rope, rope reel, pipe holder, tool box, wrenches, etc ; Sarven patent "A" wheels, Swede iron frame and forging, Concord axle. Painted English vermilion, plainly striped.

Price $110 00



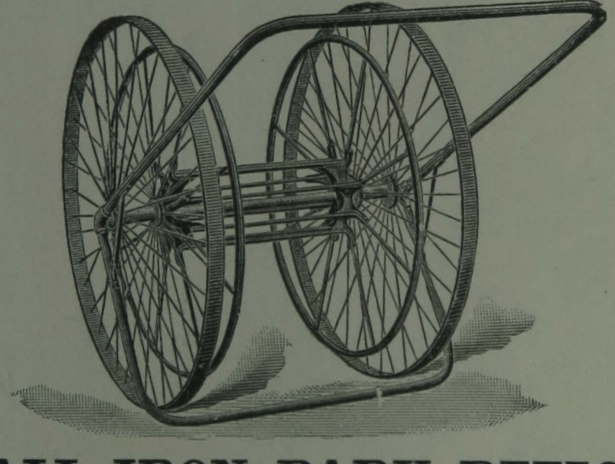
PORTABLE WAREHOUSE HOSE REELS.

IRON FRAME.

We will send wood wheels, unless bicycle wheels are specified. This reel has a strong iron frame, and is made to take the place of a hose jumper when a cheaper article is desired. Made in three sizes. The larger one, or No. 1, has 56-inch wheels, and a carrying capacity of 500 feet of 2½-inch rubber hose. The No. 2 Reel has 48-inch wheels, and will carry 350 feet of 2½-inch rubber hose. The No. 3 has 3 feet 6-inch wheels, capacity 200 feet of 2½-inch rubber hose. All above Reels will carry a greater amount of cotton or linen hose.

LIST.

Numbers	1	2	3
Price	$50 00	45 00	40 00



ALL IRON PARK REELS.

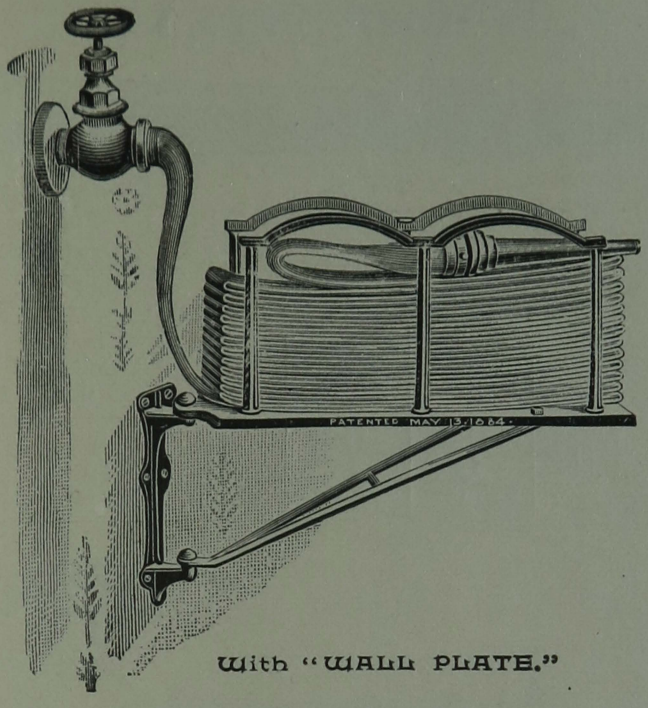
LIST.

Numbers.	Height of Wheel. Inches.	Weight. Pounds.	Capacity ¾-in. Hose. Feet.	Capacity 2½-in. Rubber Fire Hose. Feet.	Price.
21	28	30	200	...	$ 7 50
31	34	45	500	...	10 50
41	42	110	...	150	35 00
51	45	140	...	250	45 00
61	50	200	...	400	55 00

FIRE BUCKETS.

LIST.

Leather, best oak tanned	Per dozen,	$30 00
Rubber, flexible, with stiffened bottom	Per dozen,	30 00
Galvanized Iron Fire Pails, 10 quarts	Per dozen,	8 00
Galvanized Iron Fire Pails, 12 quarts	Per dozen,	10 00
Galvanized Iron Fire Pails, 14 quarts	Per dozen,	14 00
Fibre Buckets	Per dozen,	8 00



With "WALL PLATE."

"SWINGING" HOSE RACKS.

CAPACITY OF RACKS AND NUMBERS.

FOR "UNLINED LINEN" HOSE.

Numbers.	Size of Hose.	Full Capacity.
*0	For 2 inch	50 feet
00	For 2½ inch	50 feet
*1	For 2 inch	100 feet
2	For 2½ inch	100 feet
*3	For 2 inch	150 feet
4	For 2½ inch	150 feet

FOR "RUBBER LINED LINEN" OR "MILL" HOSE.

Numbers.	Size of Hose.	Full Capacity.
*3	For 2 inch	50 feet
4	For 2½ inch	50 feet
*5	For 2 inch	100 feet
6	For 2½ inch	100 feet

*For 1¼ and 1½-inch Hose, when specified, we will furnish a Narrow Bed Plate. Nos. 5 and 6 will carry heavy Hose of almost any make in 50-foot lengths.

NOTICE.—To avoid mistakes and to get the proper "Rack" when you order, give size, kind and length of hose.

"RACKS" WITH "WALL PLATES."

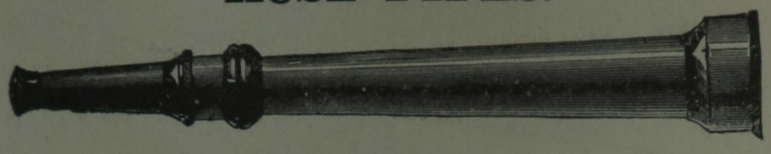
ALL RACKS JAPANNED "RED" UNLESS OTHERWISE ORDERED.

LIST.

Style of Finish.	Nos. 0 and 00.	Nos. 1 and 2.	Nos. 3 and 4.	No. 5.	No. 6.
Japanned "Red" ..... Each,	$ 5 00	$ 6 00	$ 7 00	$ 7 50	$ 8 00
Japanned "Gold" ..... Each,	5 50	6 75	7 75	8 75	8 75
Japanned White with Gold Stripe ..... Each,	5 50	6 75	7 75	8 75	8 75
Bronzed in Gold ..... Each,	5 00	6 00	7 00	7 50	8 00
Nickel Plated, Polished ..... Each,	8 00	9 50	11 00	13 00	13 50
Brass Plated, Polished ..... Each,	8 00	9 50	11 00	13 00	13 50
Solid Brass, Polished ..... Each,	13 00	16 00	19 00	24 00	24 00

SNC

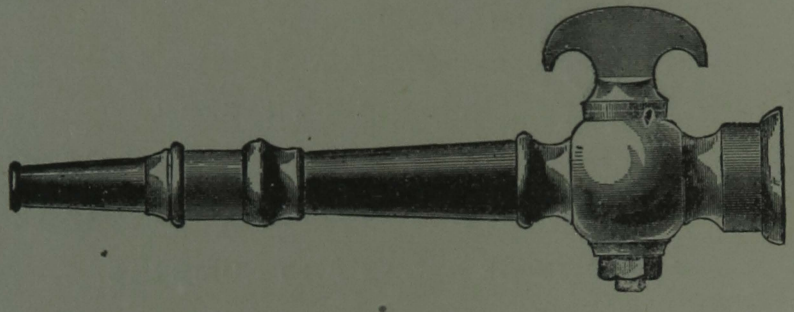
HOSE PIPES.



WITH SCREW TIP.

LIST.

Size.....Inches	¾	¾	1	1	1¼	1¼	1¼
Length.....Inches	8	12	8	12	12	15	20
Per Dozen.....	$ 8 00	10 00	10 00	12 00	20 00	24 00	30 00
Size.....Inches	1½	1½	1½	2	2	2½	.....
Length.....Inches	12	15	20	12	20	15	.....
Per Dozen.....	$25 00	30 00	36 00	38 00	50 00	75 00	.....



COCK, LARGE END.

LIST.

Size.....Inches	¾	¾	1	1	1¼	1½	1½	2	2½
Length.....Inches	9	12	9	12	15	15	20	20	24
Per Dozen.....	$18 00	18 00	20 00	20 00	45 00	60 00	80 00	110 00	200 00

FULLER,

WITH COCK.

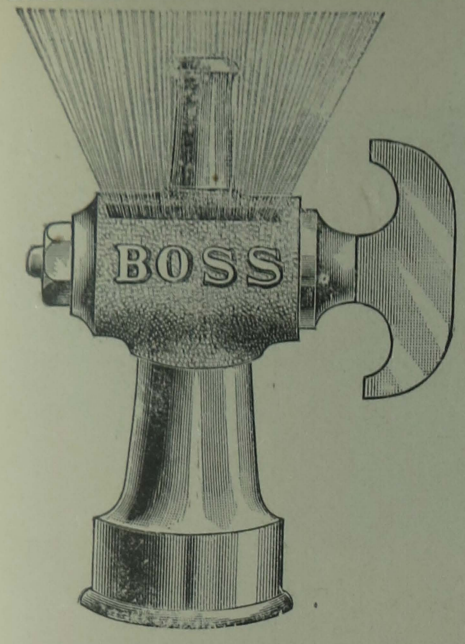
¾ inches.....Per dozen, $18 00

IMPROVED SWIVEL-HANDLE PLAY PIPES.

MADE WITH BRASS, RUBBER OR LEATHER TUBE, ANY DESIRED LENGTH.

LIST.

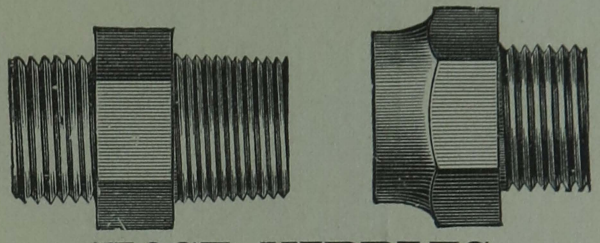
Size.....Inches	2	2½	2½	2½
Length.....Inches	20	24	30	36
Wound and Painted.....Each	$ 9 00	$11 00	$12 00	$15 00
Plain Brass.....Each	7 50	9 50	11 00	13 50
Wound and Painted, without Handles.....Each	6 50	8 50	10 00	12 50
Rubber Tube, Swivel Handles.....Each	....	.....	15 00	18 00
Leather Tubes, Swivel Handles.....Each	....	.....	.....	18 00



BOSS HOSE SPRINKLER.

This pipe will throw a perfect stream or the finest mist.
It delivers more water by spray than solid stream.
The spray comes directly through the pipe, thus avoiding strain on hose.
It has no packing nuts to work loose and leak.
It is made in best possible manner and warranted.
Size, ¾ inch.

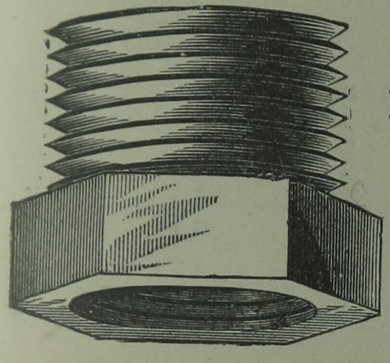
Price.....Per dozen, $12 00



HOSE NIPPLES.

LIST.

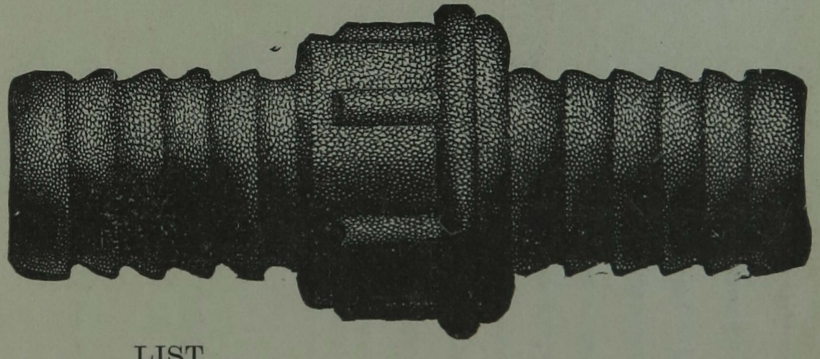
Size.....Inches,	½	¾	1	1¼	1½
Price...Per dozen,	$ 3 50	3 50	5 00	9 00	10 00
Size.....Inches,	2	2½	3	3½	4
Price...Per dozen,	$14 00	28 00	40 00	50 00	75 00



HOSE BUSHINGS AND REDUCERS.

LIST.

Size.....Inches,	1x¾	1¼x1	1½x1¼	2x1½
Price.....Per dozen,	$6 50	10 00	12 00	18 00

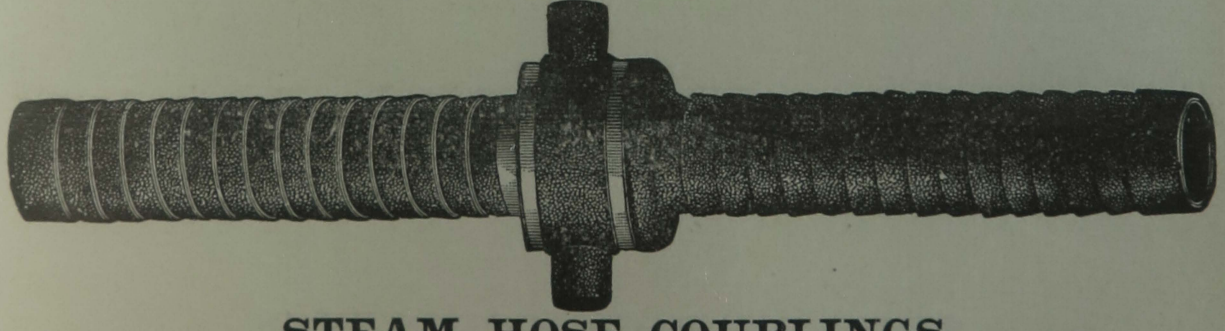


HOSE COUPLINGS.

LIST.

Size.....Inches	½	¾	1	1¼	1½	2	2½
Hose Thread.....Per dozen	$ 2 40	2 40	4 40	10 00	14 00	24 00	48 00
Iron Pipe Thread.....Per dozen	$ 2 65	2 65	4 65	10 50	15 00	26 00	50 00

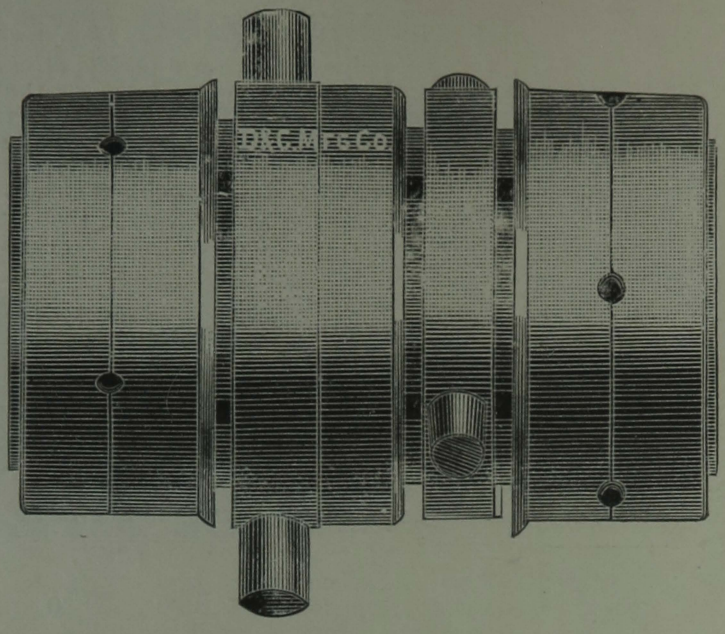
For either part of coupling, two-thirds list price.



STEAM HOSE COUPLINGS.

LIST.

Size.....Inches	½	¾	1	1¼	1½	2	2½
Iron Pipe Thread.....Per dozen	$15 00	15 00	18 00	24 00	30 00	42 00	72 00

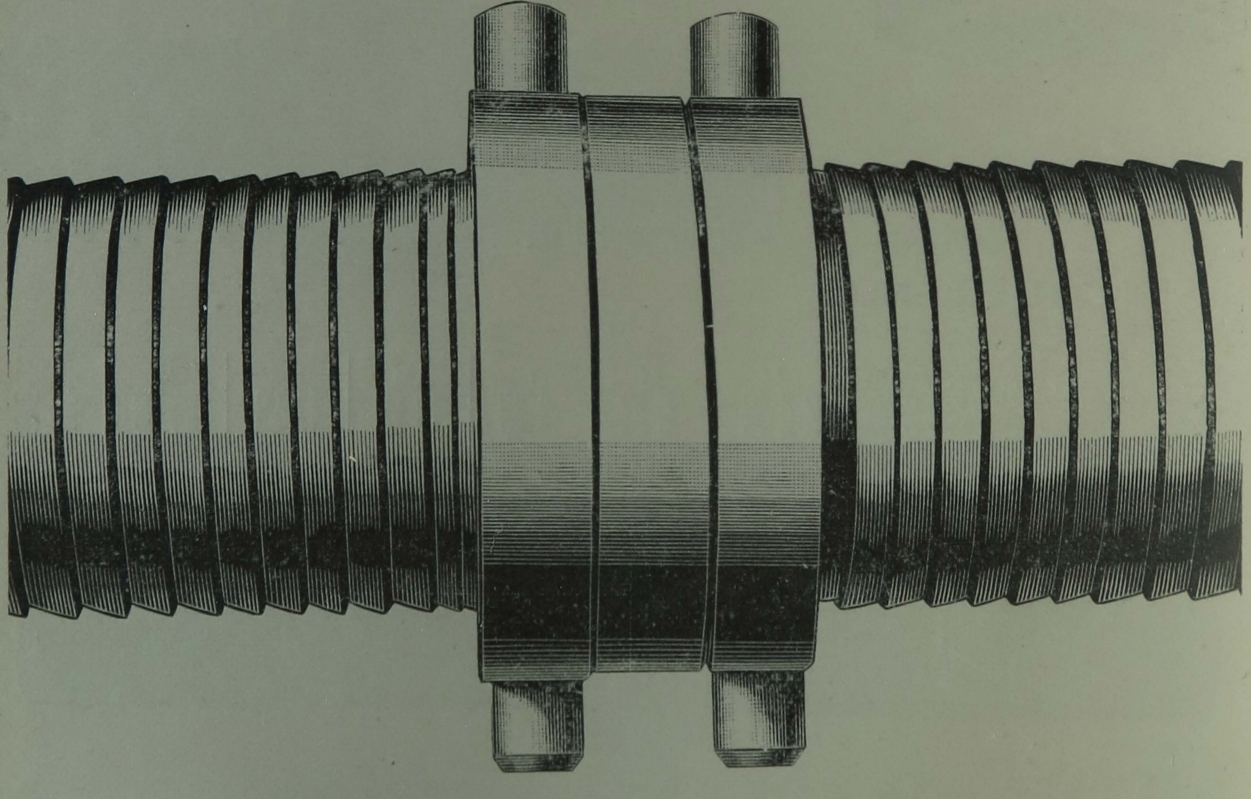


HOSE COUPLINGS.

WITH BANDS FOR LINEN OR LEATHER HOSE.

LIST.

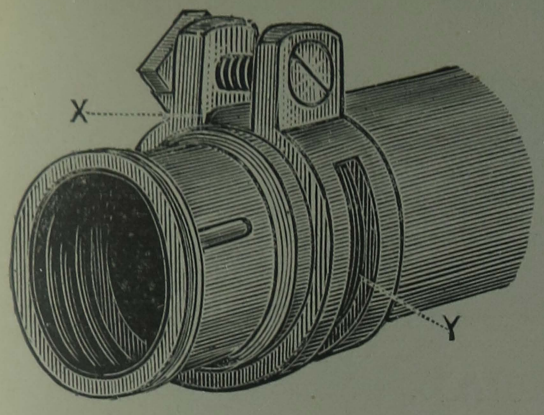
Size.....Inches,	1¼	1½	2	2¼	2½	3
Price.....Per dozen,	$24 00	27 00	42 00	51 00	51 00	96 00



SUCTION HOSE COUPLINGS.

LIST.

Size.....Inches,	2	2½	3	3½	4	4½	5	5½	6	6½	7	8
Price.....Each,	$4 00	5 25	7 50	9 50	12 50	16 00	20 00	24 00	28 00	40 00	54 00	80 00



YERDON'S HOSE BANDS.

In offering these Double Hose Bands we have no hesitancy in saying that they are the best invention yet found to securely fasten the hose to the coupling. The shoulders which receive the adjuster are prominent features, and it is wonderful the ease with which the bands can can be applied with the use of the adjuster, and there is no limit to the tightness to which the bands can be drawn about the hose.

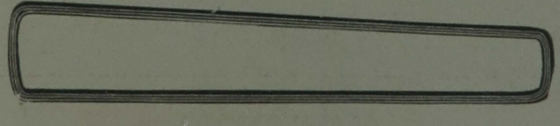
LIST.

	Price per Dozen
½ inch, 4 ply Steam Hose	$1 50
¾ inch, 4 ply Steam Hose	2 00
¾ inch, 5 ply Steam Hose	2 00
1 inch, 4 ply Steam Hose	2 50
1 inch, 4 ply Air Brake Hose	2 50
1 inch, 6 ply Steam Hose	2 75
1¼ inch, 4 ply Air Brake Hose	3 00
1¼ inch, 5 ply Air Brake Hose	3 00
1¼ inch, 4 ply Steam Hose	3 00
1¼ inch, 6 ply Steam Hose	3 50
1½ inch, 4 ply Steam Hose	3 50
1½ inch, 5 ply Steam Hose	3 75
1½ inch, 6 ply Steam Hose	4 00
2 inch, 4 ply Steam Hose	5 50
2¼ inch, 4 ply Tank Hose	7 00
2½ inch, 4 ply Tank Hose	7 50

HOSE CLAMPS.

LIST.

Size.....Inches	½	¾	1	1¼	1½	2	2½	3
Price...Per dozen	$1 50	1 50	2 00	2 50	3 00	4 00	7 00	10 00

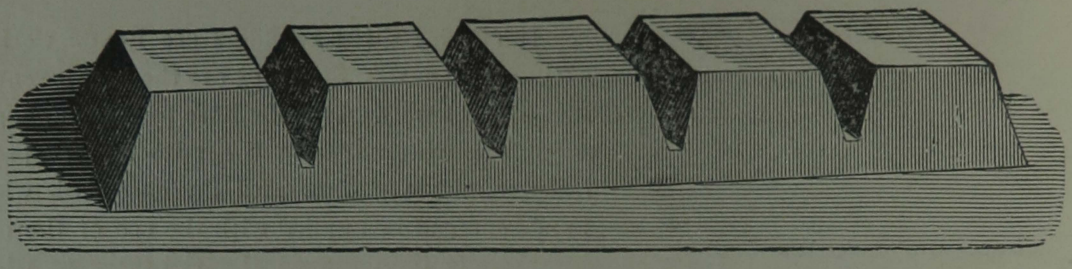


COLWELL'S WIRE HOSE BANDS.

LIST.

Numbers.....	2	4	6	8	10	12	14	16
Size of Hose...Inches	½	½	¾	¾	1	1	1¼	1¼
Length.....Inches	3⅜	3¾	4⅛	4½	5	5⅜	6	6⅜
Per Dozen.....	$0 40	0 40	0 60	0 60	0 80	0 80	1 00	1 00

METALS.



BABBITT METAL.

LIST.

Quality.	Price, Per Pound.	Quality.	Price, Per Pound.
Magnolia	$0 50	No. 1	$0 35
Past Zero	50	No. 2	25
Genuine	40	No. 3	25
Extra	40	No. 4	20

BLOCK TIN.

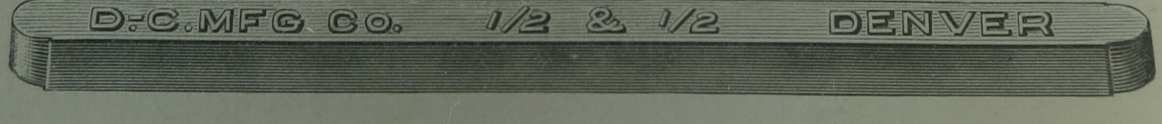
Pigs weigh about 100 pounds. Bars weigh about 1½ pounds.....Market rates

PIG LEAD.

Pigs weigh about 100 pounds.....Market rates

COPPER.

Pig Copper, Sheet Copper.....Market rates



SOLDER.

Quality half and half.....Prices on application

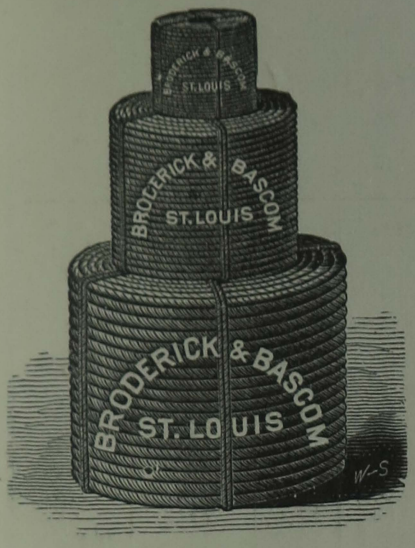
TOBIN BRONZE RODS.

Sizes from ¼ to 2 inches.....Per pound, $0 50

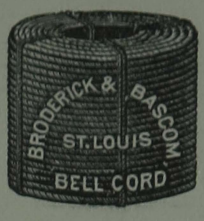
QUICKSILVER.

Per Flask.....Market rates

MANILLA AND SISAL ROPES.



SASH AND BELL CORDS.



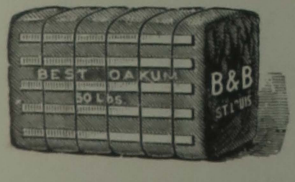
	Per Pound
American, 8 T., $\frac{3}{16}$-inch	$.....
American, 8 T., $\frac{1}{4}$-inch and larger	.....
American, 12 T., $\frac{3}{16}$-inch	.....
American, 12 T., $\frac{1}{4}$-inch and larger	.....
American, Patent, $\frac{1}{4}$-inch	.....

Basis price is for $1\frac{1}{4}$-inch circumference ($\frac{7}{16}$-inch diameter) and upwards.

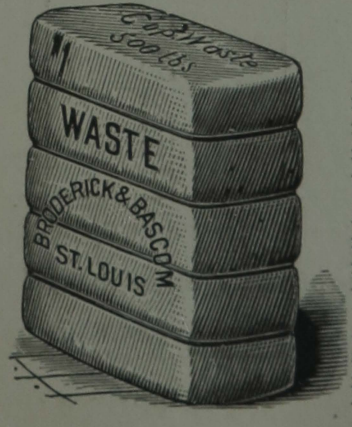
LIST.

Diameter. Inches.	Circumference. Inches.	Weight of 1,000 Feet. Pounds.	Number of Feet in one Pound.	Strength of New Manilla Rope. Pounds.
$\frac{1}{4}$	$\frac{3}{4}$-in., 6 Threads.	23	43	450
$\frac{5}{16}$	1 -in., 9 Threads.	33	30	750
$\frac{3}{8}$	$1\frac{1}{8}$-in.,12 Threads.	42	24	950
$\frac{7}{16}$	$1\frac{1}{4}$	52	19	1,200
$\frac{1}{2}$	$1\frac{1}{2}$	74	$13\frac{1}{2}$	1,700
$\frac{9}{16}$	$1\frac{3}{4}$	101	10	2,300
$\frac{5}{8}$	2	132	$7\frac{1}{2}$	3,000
$\frac{3}{4}$	$2\frac{1}{4}$	167	6	3,900
$\frac{13}{16}$	$2\frac{1}{2}$	207	5	4,700
$\frac{7}{8}$	$2\frac{3}{4}$	250	4	5,700
1	3	297	$3\frac{1}{3}$	6,750
$1\frac{1}{16}$	$3\frac{1}{4}$	349	$2\frac{7}{8}$	7,900
$1\frac{1}{8}$	$3\frac{1}{2}$	405	$2\frac{1}{2}$	9,200
$1\frac{1}{4}$	$3\frac{3}{4}$	465	$2\frac{1}{6}$	10,600
$1\frac{5}{16}$	4	529	$1\frac{9}{10}$	12,000
$1\frac{3}{8}$	$4\frac{1}{4}$	597	$1\frac{2}{3}$	13,500
$1\frac{7}{16}$	$4\frac{1}{2}$	669	$1\frac{1}{2}$	15,250
$1\frac{1}{2}$	$4\frac{3}{4}$	746	$1\frac{1}{3}$	16,900
$1\frac{5}{8}$	5	826	$1\frac{1}{5}$	18,750
$1\frac{3}{4}$	$5\frac{1}{2}$	1,000	1	22,700
$1\frac{13}{16}$	$5\frac{3}{4}$	1,100	11 inches	25,000
$1\frac{7}{8}$	6	1,190	10 inches	27,000
2	$6\frac{1}{4}$	1,291	$9\frac{3}{10}$ inches	29,300

OAKUM.



	Pounds in Bale.	Price per Bale.
Best	50	$7 50
U. S. Navy	50	6 50
Navy	50	6 00
Plumbers' Navy	50	5 00



WASTE.

	Per Pound.
WHITE COTTON.	
No. 1	$...
No. 2	....
No. 3	....
Machine Cop	....
COLORED COTTON.	
No. 1	....
No. 2	....
No. 3	....
WOOL WASTE.	
Best	....
No. 1	....
No. 2	....

LAP-WELDED CASING.

LIST.

DESCRIPTION.				DENVER.	MANUFACTURERS.	DESCRIPTION.				DENVER.	MANUFACTURERS.
Inside Diam. Inches.	Actual outside Diam. Inches.	Weight per Foot. Lbs.	No. of Threads per Inch of Screw.	List Price.	Price, Per Foot.	Inside Diam. Inches.	Actual outside Diam. Inches.	Weight per Foot. Lbs.	No. of Threads per Inch of Screw.	List Price.	Price, Per Foot.
2	2¼	2.22	14	$18 30	$ 24	5⅝	6	10.46	14	$75 20	$ 73
2¼	2½	2.82	14	.....	26	5⅝	6	12.04	11½	.....	83
2½	2¾	3.13	14	23 20	27	5⅝	6	14.20	11½	.....	95
2¾	3	3.45	14	.....	29	5⅝	6	16.70	11½	.....	1 13
3	3¼	4.10	14	28 80	32	6¼	6⅝	11.58	14	.....	85
3¼	3½	4.45	14		35	6¼	6⅝	13.32	14 & 11½	.....	97
3½	3¾	4.78	14	33 90	37	6¼	6⅝	17.02	11½	....	1 18
3¾	4	5.56	14	.....	43	6⅝	7	12.34	14	104 90	93
4	4¼	6.00	14	42 40	46	6⅝	7	17.51	11½ & 10	.....	1 27
4¼	4½	6.36	14	45 30	50	7¼	7⅝	13.55	14	.....	1 06
4¼	4½	9.38	14	.....	67	7⅝	8	15.41	11½	131 50	1 22
4½	4¾	6.73	14	49 40	52	7⅝	8	20 17	11½	.....	1 53
4½	4¾	9.39	14	.....	67	8¼	8⅝	16.07	11½	.....	1 25
4¾	5	7.80	14	54 60	58	8¼	8⅝	20.10	11½	.....	1 56
5	5¼	8.20	14	59 40	61	8¼	8⅝	24.38	11½ & 8	.....	1 86
5	5¼	9.86	14	.....	71	8⅝	9	17 60	11½	.... .	1 51
5	5¼	12 80	11½	.....	87	9⅝	10	21.90	11½	.....	1 80
5	5¼	15.88	11½	.....	1 06	10⅝	11	26.72	11½	.....	2 13
5 3/16	5½	8.62	14	.....	63	11⅝	12	30.35	11½	.....	2 42
5 3/16	5½	12.49	11½	.....	84	12½	13	33.78	11½	.....	2 95

LAP-WELDED BOILER TUBES.

LIST.

Outside Diameter. Inches.	Thickness. Inches.	Thickness Nearest Bmg. W. G.	Nominal Weight Per Foot.	Price. Per Foot.
1	.095	13	.90	$ 37
1¼	.095	13	1.15	35
1½	.095	13	1 40	32
1¾	095	13	1.66	32
2	.095	13	1.91	30
2¼	.095	13	2.16	32
2½	.109	12	2.75	36
2¾	.109	12	3.04	39
3	.109	12	3.33	39
3¼	.120	11	3.96	45
3½	.120	11	4.28	48
3¾	.120	11	4.60	55
4	.134	10	5.47	60
4½	.134	10	6 17	69
5	.148	9	7.58	82
6	.165	8	10.16	1 08

The above prices are for tubes up to 20 feet long—for tubes in excess of that length, ten per cent. will be added to net of invoice.

Extra thickness of tubes will be charged as per list of extra gauges.

EXTRA HEAVY OR HYDRAULIC TUBES.

PRICES ON APPLICATION.

WROUGHT IRON PIPE.

LIST.

Inside Diameter. Inches.	Weight Per Foot. Pounds.	Thickness. Inches.	DENVER. Price, per 100 Feet. Black.	DENVER. Price, per 100 Feet, Galvanized	MANUFACTURERS. Price, Per Foot. Black.	MANUFACTURERS. Price, Per Foot. Galvanized.
1/8	.24	.068	$ 4 00	.....	$ 05½	$ 08
1/4	.42	.088	4 40	.....	05½	07½
3/8	.56	091	4 70	$ 7 00	05½	07½
1/2	.84	.109	6 30	9 10	07	09½
3/4	1.12	.113	7 80	11 20	08½	11½
1	1.67	.134	11 00	15 90	11¾	16
1¼	2.24	.140	14 70	21 70	15½	22
1½	2 68	145	18 40	26 90	26	31
2	3.61	.154	24 80	36 40	35	42
2½	5.74	.204	37 70	54 60	52	62
3	7.54	.217	49 30	70 80	68	80
3½	9.00	.226	58 80	86 20	81	98
4	10.66	237	69 20	102 00	95	1 16
4½	12.49	.246	87 90	129 30	1 25	1 50
5	14.50	.259	100 40	150 60	1 42	1 75
6	18.76	.280	130 60	190 50	1 85	2 20
7	23 27	.301	169 70	.....	2 45	3 00
8	28.18	.322	204 60	.....	2 95	3 70
9	33.70	.344	255 70	.....	3 75	....
10	40.00	366	318 30	.....	4 75	....
11	45.00	.375	390 50	.....	6 00	....
12	49.00	.375	448 30	.....	7 00	....
13	54.00	.375	532 90	.....	8 50	....
14	58.00	.375	615 50	.....	10 00	....
15	62.00	375	722 70	.....	12 00	....

Extra Strong, double the above list.

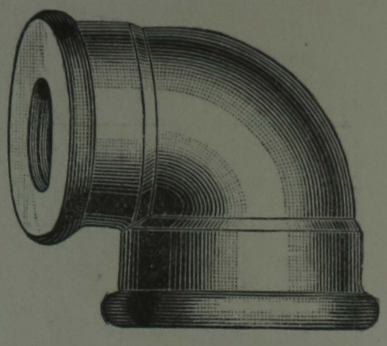
MANUFACTURERS.

LIST.

X STRONG. Size. Inches.	Outside Diameter. Inches.	Inside Diameter. Inches.	Thickness. Inches.	Weight Per Foot. Pounds.	Price, Per Foot.
1/8	.405	.205	.100	.29	$0 11
1/4	.540	.294	.123	.54	11
3/8	.675	.421	.127	.74	11
1/2	.840	.542	149	1.09	14
3/4	1.05	.736	.157	1.39	17
1	1.315	.951	.182	2.17	23½
1¼	1.66	1.272	.194	3 00	31
1½	1.900	1.494	.203	3.63	52
2	2.375	1 933	.221	5.02	70
2½	2.875	2.315	.280	7.67	1 04
3	3.500	2.892	.304	10.25	1 36
3½	4.000	3.358	.321	12.47	1 62
4	4.500	3.818	.341	14.97	1 90
4½	5.000	4.280	.361	18.22	2 50
5	5.563	4.813	.375	20.54	2 84
6	6.625	5.750	.437	28.58	3 70
7	7.625	6.625	.500	37.67	4 90
8	8.625	7.625	.500	43.00	5 90

XX STRONG. Size. Inches.	Outside Diameter. Inches.	Inside Diameter. Inches.	Thickness. Inches.	Weight Per Foot. Pounds.	Price, Per Foot.
1/2	.84	.244	.298	1.70	$0 28
3/4	1.05	.422	.314	2.44	34
1	1.315	.587	.364	3.65	47
1¼	1.66	.885	.388	5.20	62
1½	1.90	1.088	.406	6.40	1 04
2	2.375	1.491	.442	9.02	1 40
2½	2.875	1.755	.560	13.68	2 73
3	3.50	2.284	.608	18.56	3 57
3½	4.00	2.716	.642	22.70	4 25
4	4.50	3.136	.682	27.48	5 00
4½	5.00	3.564	.718	32.53	6 56
5	5.563	4.063	.75	38.12	7 45
6	6 625	4.875	.875	53.11	9 25
7	7.625	5.875	.875	62.38	12 25
8	8.625	6.875	875	71.62	14 75
....	.....	.....	....	.....	.....
....	.....	.....	....	.....	.....
....	.....	.....	....	.....	.....

MALLEABLE IRON PIPE FITTINGS.



ELBOWS.

LIST.

Size.....Inches,	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2
R. H.....Each,	$0 04	0 04	0 06	0 10	0 15	0 22	0 25	0 35
R. and L.....Each,	....	05	07	12	17	25	30	40
Galvanized, R. H.....Each,	....	05	08	14	20	32	40	60

Size.....Inches,	2	2 1/2	3	3 1/2	4	5	6	....
R. H.....Each,	$0 50	0 80	1 50	2 25	3 00	4 00	5 00	....
R. and L.....Each,	65	....	....	....	....	....	....	....
Galvanized, R. H.....Each,	90	1 35	2 60	3 75	5 00	....	....	....

45° ELBOWS.

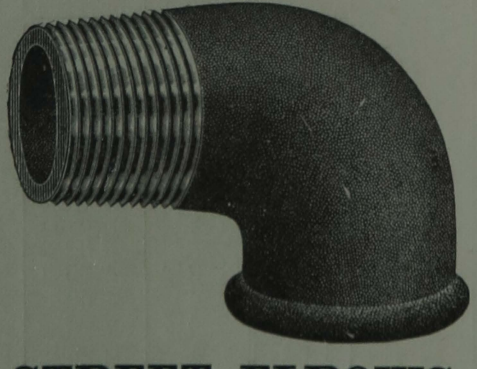
LIST.

Size.....Inches,	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Price.....Each,	$0 08	0 10	0 12	0 18	0 26	0 36	0 54	82	1 25	2 50	3 25	4 50
Galvanized.....Each,	12	15	20	25	40	50	85	1 35	....	....	....	....

SIDE OUTLET ELBOWS.

LIST.

Size.....Inches,	3/8	1/2	3/4	1	1 1/4	1 1/2
Price.....Each,	$0 08	0 10	0 18	0 30	0 45	0 60

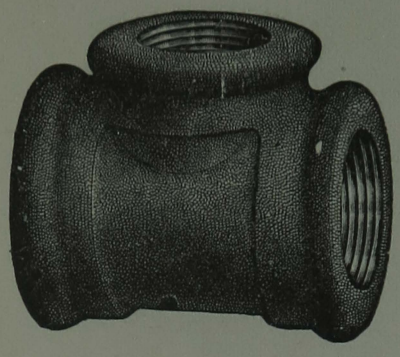


STREET ELBOWS.

LIST.

Size.....Inches,	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
Price.....Each,	$0 10	0 12	0 20	0 25	0 40	0 55	0 90	1 50
Galvanized.....Each,	12	15	28	35	55	80	1 30	....

MALLEABLE IRON PIPE FITTINGS—Continued.



TEES.

LIST.

Size.....Inches,	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Each.....	$0 07	0 07	0 08	0 11	0 15	0 25	0 30	0 45	0 60	1 05	1 70	2 50	3 00
Galvanized.....Each,	....	09	10	16	20	38	50	70	1 00	1 90	3 00	4 25	5 75

CROSSES.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Each.....$0 08	0 10	0 12	0 20	0 30	0 40	0 60	1 00	1 75	3 00	3 25	5 25
Galvanized.....Each,	....	....	17	25	45	60	90	1 50	2 75	....	....	....

REDUCERS.

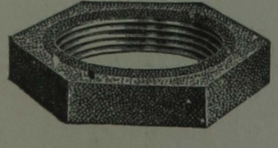
LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Each.....	$0 03	0 03	0 05	0 10	0 16	0 20	0 28	0 45	0 70	1 00	1 50	1 85
Galvanized.....Each,	....	....	08	15	25	35	45	75	1 05	1 65	2 40	3 05

CAPS.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Each.....	$0 03	0 04	0 05	0 08	0 12	0 16	0 24	0 32	0 45	0 85	1 00	1 20
Galvanized.....Each,	04	05	08	12	17	24	38	52	76	1 30	1 60	2 00

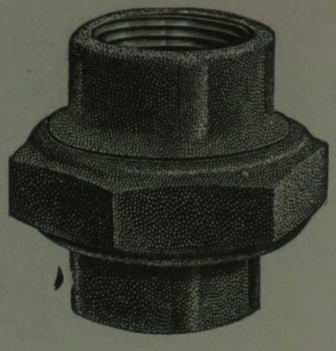


LOCK NUTS.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2
Each.....	$0 02	0 03	0 04	0 05	0 07	0 09	0 11	0 18
Galvanized.....Each,	03	04	05	07	10	14	20	30

MALLEABLE IRON PIPE FITTINGS—Continued.



UNIONS.

LIST.

Size.....Inches,	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Malleable Iron.....Each,	$0 18	0 18	0 20	0 22	0 27	0 33	0 46	0 58	0 75	1 55	2 10	3 65	4 35
Galvanized.....Each,	27	27	30	33	40	50	70	90	1 15	2 35	3 15	5 50	6 50

BUSHINGS.

LIST.

Size.....Inches,	⅜	½	¾	1	1¼	1½	2	2½
Each.....,	$0 05	0 06	0 07	0 09	0 13	0 17	0 27	0 42
Galvanized.....Each,	08	08	10	12	14	18	28	42
Faced.....Each,	08	09	11	13	17	22	32	48

MALLEABLE COUPLINGS.

RIGHT AND LEFT.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2
Plain.....Each,	$0 04	0 05	0 08	0 12	0 16	0 25	0 36	0 52
Galvanized.....Each,	06	08	10	17	25	35	55	75

RIGHT HAND.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2
Plain.....Each,	$0 03	0 04	0 07	0 10	0 14	0 20	0 25	0 35
Galvanized.....Each,	05	07	10	17	23	30	40	55

MALLEABLE IRON FLANGE UNIONS.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Each.....	$1 25	1 40	1 60	2 00	2 50	3 00	3 50	4 40	5 25	6 00	7 00	8 00	9 00

MALLEABLE IRON PIPE FITTINGS—Continued.

RETURN BENDS.

CLOSE PATTERN. RIGHT HAND.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2
Price.....Each,	$0 13	0 25	0 35	0 50	75	1 00
Galvanized.....Each,	25	35	55	75	1 15	1 65
Distance Between Centers.....Inches,	1	1¼	1½	1¾	2 3/16	2 5/8

CLOSE PATTERN. RIGHT AND LEFT.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2
Right and Left.....Each,	$0 15	0 30	0 45	0 60	0 90	1 25
Left Hand.....Each,	15	30	45	60	90	1 25

OPEN PATTERN. RIGHT HAND.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2	2½	3
Price..... Each,	$0 15	0 30	0 50	0 65	0 85	1 25	2 00	3 00
Galvanized.....Each,	25	45	70	90	1 25	2 00	3 50	5 00
Distance Between Centers.....Inches,	1½	2	2½	3	3½	4	4½	5

COUPLINGS.

LIST.

Size.....Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Right Hand, Plain.....Each	$ 05	$ 05	$ 06	$ 07	$ 10	$ 13	$ 17	$ 21	$ 28	$ 40	$ 60
Right and Left, Plain.....Each	07	07	08	11	15	20	25	30	50	85	1 20
Right Hand, Galvanized.....Each	06	06	08	10	13	18	25	32	40	55	80
Right Hand, Faced.....Each	.....	09	10	12	16	22	30	40	50	70	90

Size.....Inches	3½	4	4½	5	6	7	8	9	10	12	.....
Right Hand, Plain.....Each	$ 80	$1 00	$1 50	$1 65	$2 40	$3 25	$4 25	$5 50	$7 50	$10 00	.....
Right Hand, Galvanized.....Each	1 05	1 40	2 00	2 25	3 25	....	.....	.....	.....	.....	.....
Right Hand, Faced.....Each	1 20	1 50	2 10	2 40	3 60	.....	....	.....	.....	.....	....

MALLEABLE IRON PIPE FITTINGS—Continued.

REVISED LIST AND CLASSIFICATION.

Class.....	A	B	C	D	E
Elbows.....	{⅛ x ⅛, ¼ x ⅛, ⅜ x ⅛}	{⅜ x ¼, ½ x ¼, ¼, ⅜}	{½, ½ x ⅜}	{*¾, * 1}	†1¼ and larger
Elbows, Right and Left.	¼, ⅜	½	¾ and 1	1¼ and larger	.....
Elbows, 45°	.....	½ and smaller	¾ to 2 incl.	2½ and larger	.....
Elbows, Street	.....	¼ and ⅜	{½, ¾, ¾x½, 1x¾}	1 and larger	.....
Elbows, Side Outlet	.....	½ and smaller	¾ and larger	.....	.....
Elbows, Drop.....	.....	½ and smaller	¾ and larger	.....	.....
Tees.....	{⅛ x ⅛, ⅛ x ¼, ¼ x ⅛, ⅜ x ⅛}	{⅜, ¼, ¼ x ⅜, ⅜ x ¼ x ¼, ⅜ x ¼, ⅜ x ¼ x ⅜}	{½, ½ reduc.}	{*¾, * 1}	†1¼ and larger
Tees, Four Ways	.....	½ and smaller	¾ and larger	.....	.....
Tees, Drop	.....	½ and smaller	¾ and larger	.....	.....
Crosses.....	.....	¼, ⅜ and ½	¾ and 1	*1¼ and larger	.....
Reducing Crosses.....	.....	1 and smaller	.....	*1¼ and larger	.....
Return Bends.....	.....	⅜ and ½	¾ and 1	1¼ and larger	.....
Return Bends, R. and L.	⅜, ½	¾ and 1	1¼ and larger	.....	.....
Couplings, R. H.....	⅛	⅜ and ¼	½ and ¾	1 and 1¼	1½ and larger
Couplings, R. and L....	⅛	⅜ and ¼	½ and ¾	1 and larger	.....
Couplings, Reducing....	{¼ x ⅛, ⅜ x ⅛}	{⅜ x ¼ to ¾ x ⅜}	{¾ x ½ to 1 inclusive.}	1¼ and larger	.....
Caps.....	.....	⅜ and ¼	½, ¾ and 1	1¼ and larger	.....
Locknuts.	.....	¼, ⅜ and ½	¾, 1, 1¼	1½ and larger	.....
Extension Pieces.....	.....	⅜ and ½	¾ and larger	.....	.....
Waste Nuts.....	.....	¾ and smaller	1 and larger	.....	.....
Chandelier Hooks.....	.....	All sizes	.....	.....	.....
Wall Plates.....	.....	All sizes	.....	.....	.....
Rod Couplings.....	All sizes	.....	.....	.....	.....
Y Bends.....	.....	¾ and ½	1 and larger	.....	.....

*Such fittings in Class D as have one or more openings smaller than ¾ to be Class C.

†Such fittings in Class E as have one or more openings smaller than 1 inch to be Class D.

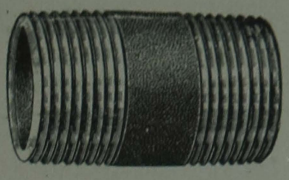
The run of Tees gives the sizes for the purpose of classification and the outlet being larger does not change it.

LIST.

Class.....	A	B	C	D	E
Price, Black..Per pound	30	20	16	13	11
Price, Galv.,..Per pound	40	27	23	20	18

An extra charge of 10c. per pound list will be added to price of galvanized fittings not enumerated in standard list.

Close.



Shoulder.

WROUGHT IRON NIPPLES.

RIGHT HAND.

LIST.

Size. Inches.	LENGTH—INCHES.						PRICES.	
	Close.	Short.	Long.				Close or Short	Long.
1/8	3/4	1 1/2	2	2 1/2	3	3 1/2	$ 03	$ 04
1/4	7/8	1 1/2	2	2 1/2	3	3 1/2	03	04
3/8	1	1 1/2	2	2 1/2	3	3 1/2	03	04
1/2	1 1/8	1 1/2	2	2 1/2	3	3 1/2	04	05
3/4	1 3/8	2	2 1/2	3	3 1/2	4	05	07
1	1 1/2	2	2 1/2	3	3 1/2	4	06	09
1 1/4	1 5/8	2 1/2	3	3 1/2	4	4 1/2	09	12
1 1/2	1 3/4	2 1/2	3	3 1/2	4	4 1/2	10	15
2	2	2 1/2	3	3 1/2	4	4 1/2	13	19
2 1/2	2 1/2	3	3 1/2	4	4 1/2	5	28	38
3	2 1/2	3	3 1/2	4	4 1/2	5	35	50
3 1/2	2 3/4	4	4 1/2	5	5 1/2	6	50	68
4	3	4	4 1/2	5	5 1/2	6	58	78
4 1/2	3	4	4 1/2	5	5 1/2	6	88	1 18
5	3 1/2	4 1/2	5	5 1/2	6	6 1/2	1 05	1 40
6	3 1/2	4 1/2	5	5 1/2	6	6 1/2	1 33	1 75
7	4	5	...	...	...	...	1 88	....
8	4	5	...	...	...	...	2 25	....
9	...	...	...	...	...	...	3 25	....
10	...	...	...	...	...	...	4 00	....
11	...	...	...	...	...	...	5 00	....
12	...	...	...	.	...	...	6 00	..

EXTRA LONG NIPPLES.

LIST.

Size. Inches.	LENGTH—INCHES.								
	4	5	6	7	8	9	10	11	12
1/8	$0 05	$0 06	$ 06	$ 07	$ 08	$ 08	$ 09	$ 10	$ 10
1/4	05	06	06	07	08	08	09	10	10
3/8	05	06	06	07	08	08	09	10	10
1/2	06	07	08	09	10	10	11	12	13
3/4	....	08	09	10	11	12	13	14	15
1	....	11	12	14	15	16	18	19	20
1 1/4	....	14	16	18	19	21	23	25	27
1 1/2	....	17	20	22	24	27	29	31	34
2	....	22	25	28	31	34	36	39	42
2 1/2	....	....	44	49	55	60	65	70	75
3	....	....	58	65	72	79	85	93	1 00
3 1/2	....	....	....	76	85	93	1 03	1 13	1 20
4	....	....	....	88	98	1 08	1 18	1 28	1 38
4 1/2	....	...	....	1 33	1 48	1 63	1 78	1 93	2 08
5	....	....	....	1 50	1 68	1 85	2 03	2 20	2 38
6	....	....	....	1 88	2 10	2 33	2 55	2 78	3 00
7	....	....	2 13	2 45	2 75	3 05	3 35	3 65	3 95
8	....	....	2 63	2 93	3 30	3 65	4 00	4 38	4 75
9	....	....	....	3 70	4 15	4 60	5 05	5 50	5 95
10	....	....	....	4 68	5 35	6 03	6 70	7 38	8 05
11	....	....	....	5 93	6 85	7 78	8 70	9 63	10 50
12	....	....	....	6 75	7 50	8 25	9 00	9 75	10 50

WROUGHT IRON NIPPLES—Continued.

RIGHT AND LEFT HAND.

LIST.

Size. Inches.	LENGTH, INCHES.						PRICES.	
	Close.	Short.	Long.				Close or Short.	Long.
1/8	3/4	1 1/2	2	2 1/2	3	3 1/2	$0 04	$0 06
1/4	7/8	1 1/2	2	2 1/2	3	3 1/2	04	06
3/8	1	1 1/2	2	2 1/2	3	3 1/2	04	06
1/2	1 1/8	1 1/2	2	2 1/2	3	3 1/2	05	07
3/4	1 3/8	2	2 1/2	3	3 1/2	4	07	09
1	1 1/2	2	2 1/2	3	3 1/2	4	09	11
1 1/4	1 5/8	2 1/2	3	3 1/2	4	4 1/2	12	16
1 1/2	1 3/4	2 1/2	3	3 1/2	4	4 1/2	14	19
2	2	2 1/2	3	3 1/2	4	4 1/2	18	24
2 1/2	2 1/2	3	3 1/2	4	4 1/2	5	38	50
3	2 1/2	3	3 1/2	4	4 1/2	5	50	65
3 1/2	2 3/4	4	4 1/2	5	5 1/2	6	65	85
4	3	4	4 1/2	5	5 1/2	6	75	1 00

EXTRA LONG NIPPLES.

LIST.

Size. Inches.	LENGTH, INCHES.								
	4	5	6	7	8	9	10	11	12
1/8	$0 07	$0 07	$0 08	$ 09	$ 10	$ 11	$ 11	$ 12	$ 13
1/4	07	07	08	09	10	11	11	12	13
3/8	07	07	08	09	10	11	11	12	13
1/2	08	09	10	10	11	12	13	14	15
3/4	..	10	11	12	13	14	15	16	17
1	..	13	14	16	17	19	21	22	24
1 1/4	..	17	18	20	22	24	26	28	30
1 1/2	..	21	23	26	28	30	33	35	38
2	..	26	30	33	36	40	43	47	50
2 1/2	..	..	55	60	65	70	75	80	85
3	..	..	73	79	85	92	98	1 05	1 13
3 1/2	..	..	..	93	1 00	1 08	1 15	1 23	1 30
4	..	..	.	1 05	1 15	1 25	1 35	1 45	1 55

WROUGHT IRON NIPPLES—Continued.

GALVANIZED RIGHT HAND.

LIST.

Size. Inches.	LENGTH, INCHES.						PRICES.	
	Close.	Short.	Long.				Close or Short.	Long.
1/8	3/4	1 1/2	2	2 1/2	3	3 1/2	$ 04	$ 06
1/4	7/8	1 1/2	2	2 1/2	3	3 1/2	04	06
3/8	1	1 1/2	2	2 1/2	3	3 1/2	04	06
1/2	1 1/8	1 1/2	2	2 1/2	3	3 1/2	05	07
3/4	1 3/8	2	2 1/2	3	3 1/2	4	06	10
1	1 1/2	2	2 1/2	3	3 1/2	4	09	13
1 1/4	1 5/8	2 1/2	3	3 1/2	4	4 1/2	13	19
1 1/2	1 3/4	2 1/2	3	3 1/2	4	4 1/2	15	24
2	2	2 1/2	3	3 1/2	4	4 1/2	20	31
2 1/2	2 1/2	3	3 1/2	4	4 1/2	5	38	55
3	2 1/2	3	3 1/2	4	4 1/2	5	50	75
3 1/2	2 3/4	4	4 1/2	5	5 1/2	6	73	1 03
4	3	4	4 1/2	5	5 1/2	6	80	1 23
4 1/2	3	4	4 1/2	5	5 1/2	6	1 25	1 80
5	3 1/2	4 1/2	5	5 1/2	6	6 1/2	1 75	2 20
6	3 1/2	4 1/2	5	5 1/2	6	6 1/2	2 00	2 75
7	4	5	...	...	...	...	3 00	....
8	4	5	...	...	...	...	3 50	....

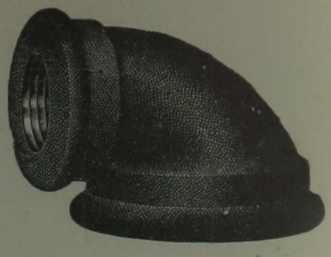
EXTRA LONG NIPPLES.

LIST.

Size. Inches.	LENGTH, INCHES.								
	4	5	6	7	8	9	10	11	12
1/8	$0 08	$0 09	$ 10	$ 11	$ 12	$ 13	$ 14	$ 16	$ 17
1/4	08	09	10	11	12	13	14	16	17
3/8	08	09	10	11	12	13	14	16	17
1/2	09	10	12	13	14	16	17	19	20
3/4	..	12	13	15	16	18	20	21	23
1	..	16	18	21	23	25	28	30	32
1 1/4	..	21	24	27	30	33	37	40	43
1 1/2	..	26	30	34	38	42	46	50	54
2	..	34	40	45	50	55	61	66	71
2 1/2	..	..	65	75	85	95	1 05	1 15	1 25
3	..	..	85	98	1 08	1 20	1 30	1 43	1 60
3 1/2	..	..	....	1 18	1 33	1 48	1 63	1 78	1 93
4	..	..	....	1 40	1 58	1 75	1 93	2 10	2 28
4 1/2	..	..	....	2 05	2 25	2 45	2 65	2 85	3 05
5	..	..	....	2 38	2 68	2 98	3 28	3 58	3 88
6	..	..	....	2 93	3 28	3 63	3 98	4 33	4 68
7	..	..	3 50	3 95	4 45	4 95	5 45	5 95	6 45
8	..	..	4 20	4 83	5 45	6 08	6 70	7 33	7 95

CAST IRON PIPE FITTINGS.

ELBOWS.



LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3
R. H.....Each,	$0 05	0 05	0 06	0 08	0 10½	0 16	0 20	0 28	0 50	0 75
R. and L.....Each,	06	06	07	09	12	18	23	32	60	85
Galvanized, R. H.....Each,	10	10	12	16	21	32	40	56	1 00	1 50
With Side Outlet.....Each,	....	....	18	24	30	48	60	84	1 50	2 25

Size.....Inches,	3½	4	4½	5	6	7	8	9	10	12
R. H.....Each,	$1 05	1 20	1 75	2 00	2 75	4 70	6 75	9 00	13 50	20 00
Galvanized R. H.....Each,	2 10	2 40	3 50	4 00	5 50	9 40	13 50	18 00	27 00	40 00
With Side Outlet.....Each,	3 15	3 60	5 25	6 00	8 25	....	.....	.....	.....	.....

REDUCING ELBOWS.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Reducing.....Each,	....	$0 06	0 07	0 09	0 12	0 18	0 23	0 32	0 60	0 85
Galvanized Reducing..Each,	....	12	14	18	24	36	46	64	1 20	1 70

Size.....Inches,	3½	4	4½	5	6	7	8	9	10	12
Reducing.....Each,	$1 20	1 40	2 00	2 30	3 15	5 40	7 75	10 50	15 50	23 00
Galvanized Reducing...Each,	2 40	2 80	4 00	4 60	6 30	10 80	15 50	21 00	31 00	46 00

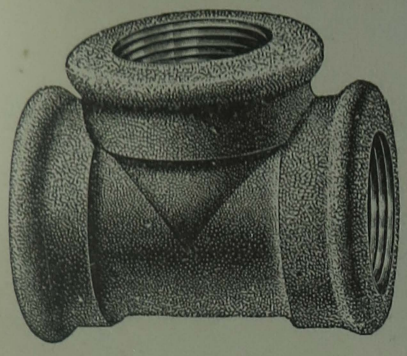
45° ELBOWS.

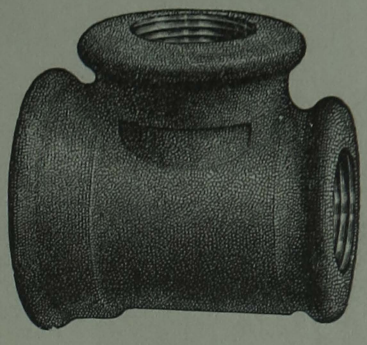
LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3
45°.....Each,	$0 06	0 06	0 07	0 10	0 12	0 19	0 24	0 34	0 60	0 90
Galvanized 45°.....Each,	12	12	14	20	24	38	48	68	1 20	1 80

Size.....Inches,	3½	4	4½	5	6	7	8	9	10	12
45°.....Each,	$1 25	1 45	2 20	2 50	3 45	5 90	8 50	11 25	17 00	25 00
Galvanized 45°.....Each,	2 50	2 90	4 40	5 00	6 90	11 80	17 00	22 50	34 00	50 00

CAST IRON PIPE FITTINGS—Continued.





TEES.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Price.....Each,	$0 08	0 08	0 09	0 12	0 15	0 23	0 29	0 41	0 73	1 10
Galvanized.....Each,	16	16	18	24	30	46	58	82	1 46	2 20
With Side Outlet.....Each,	....	....	27	36	45	70	90	1 25	2 25	3 25

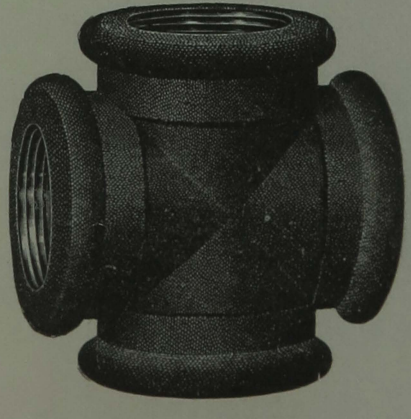
Size.....Inches,	3½	4	4½	5	6	7	8	9	10	12
Price.....Each,	1 50	1 75	2 55	3 00	4 00	6 80	9 75	13 00	19 50	29 00
Galvanized.....Each,	3 00	3 50	5 10	6 00	8 00	13 60	19 50	26 00	39 00	58 00
With Side Outlet.....Each,	4 50	5 25	7 65	9 00	12 00	....	....	....	....	....

REDUCING TEES.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Reducing.....Each,	....	$0 09	0 10	0 14	0 17	0 27	0 33	0 47	0 83	1 25
Galvanized.....Each,	....	18	20	28	34	54	66	94	1 66	2 50

Size.....Inches,	3½	4	4½	5	6	7	8	9	10	12
Reducing.....Each,	$1 75	2 00	2 95	3 50	4 60	7 80	11 25	15 00	22 50	33 50
Galvanized.....Each,	3 50	4 00	5 90	7 00	9 20	15 60	22 50	30 00	45 00	67 00



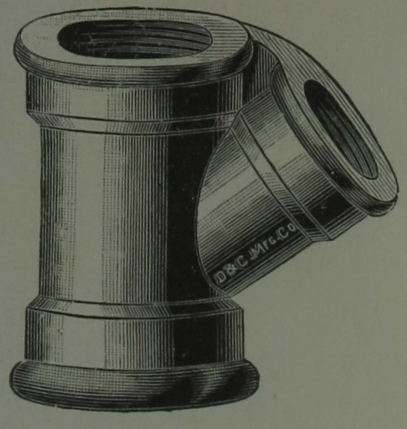
CROSSES.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Price.....Each,	....	$0 15	0 16	0 22	0 27	0 42	0 53	0 75	1 30	2 00
Galvanized.....Each,	....	30	32	44	54	84	1 06	1 50	2 60	4 00
Reducing.....Each,	....	....	18	25	30	46	60	83	1 45	2 20

Size.....Inches,	3½	4	4½	5	6	7	8	9	10	12
Price.....Each,	$2 70	3 15	4 60	5 50	7 25	12 25	17 50	23 50	35 00	52 50
Galvanized.....Each,	5 40	6 30	9 20	11 00	14 50	24 50	35 00	47 00	70 00	105 00
Reducing.....Each,	3 00	3 50	5 10	6 00	8 00	13 50	19 25	26 00	38 50	58 00

CAST IRON PIPE FITTINGS—Continued.

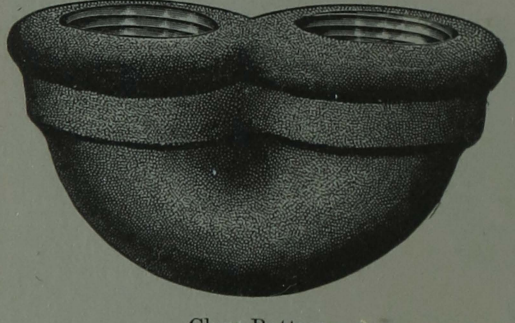


Y BENDS.

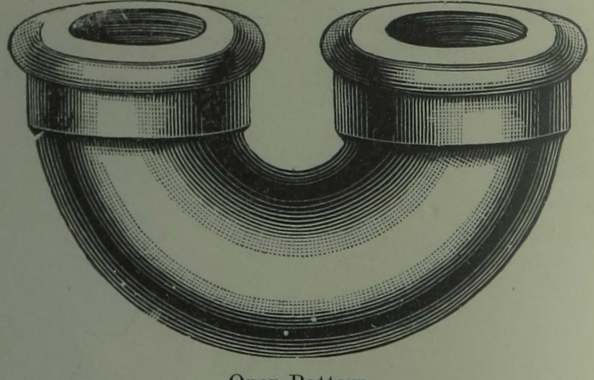
LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Price.....Each,	....	....	$0 20	0 28	0 34	0 54	0 66	0 94	1 66	2 50
Galvanized.....Each,	....	....	40	56	68	1 08	1 32	1 88	3 32	5 00
Reducing.....Each,	....	....	23	33	40	62	76	1 08	1 90	2 90

Size.....Inches,	3½	4	4½	5	6	7	8	9	10	12
Price.....Each,	$3 50	4 00	5 90	7 00	9 20	15 60	22 50	....	45 00	67 00
Galvanized ....Each,	7 00	8 00	11 80	14 00	18 40	31 20	45 00	....	90 00	134 00
Reducing.....Each,	4 00	4 60	6 80	8 00	10 60	18 00	26 00	....	51 75	77 00



Close Pattern.



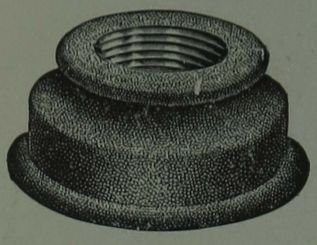
Open Pattern.

RETURN BENDS.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2	2½	3	3½
Close.....Each,	$0 18	0 20	0 22	0 28	0 40	0 57	1 20	1 70	....
Close, Galvanized..... .....Each,	36	40	44	56	80	1 14	2 40	3 40	....
Close, R. and L. or L. H.....Each,	21	23	26	33	46	66	1 40	1 95	....
Open.....Each,	....	26	30	40	55	80	1 35	2 20	....
Open, Galvanized.....Each,	....	52	60	80	1 10	1 60	2 70	4 40	....
Open, R. and L. or L. H.....Each,	....	30	35	46	64	92	1 55	2 50	....
Back Outlet.....Each,	....	38	42	60	80	1 15	2 00	3 00	....
Back Outlet, Galvanized.....Each,	....	76	84	1 20	1 60	2 30	4 00	6 00	....

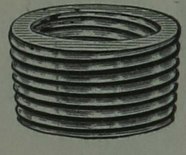
CAST IRON PIPE FITTINGS—Continued.



REDUCERS.

LIST.

Size.....Inches,	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Price.....Each,	$0 43	0 60	0 80	1 00	1 35	1 85	2 00	2 70	5 35	6 75	8 35	10 00	15 00
Galvanized.....Each,	86	1 20	1 60	2 00	2 70	3 70	4 00	5 40	10 70	13 50	16 70	20 00	30 00



Faced.

BUSHINGS.

LIST.

Size .....Inches,	....	⅜	½	¾	1	1¼	1½	2	2½	3
Price.....Each,	....	$0 04	0 04	0 05	0 06	0 07	0 09	0 14	0 21	0 30
Faced.....Each,	....	08	09	11	13	17	22	32	48	70
Galvanized.....Each,	....	08	08	10	12	14	18	28	42	60

Size .....Inches,	3½	4	4½	5	6	7	8	9	10	12
Price.....Each,	$0 40	0 50	0 75	0 93	1 25	1 87	2 75	3 25	3 75	5 00
Faced.....Each,	1 20	1 50	....	....	....	....	....	....	....	....
Galvanized.....Each,	80	1 00	1 50	1 85	2 50	3 75	5 50	6 50	7 50	10 00

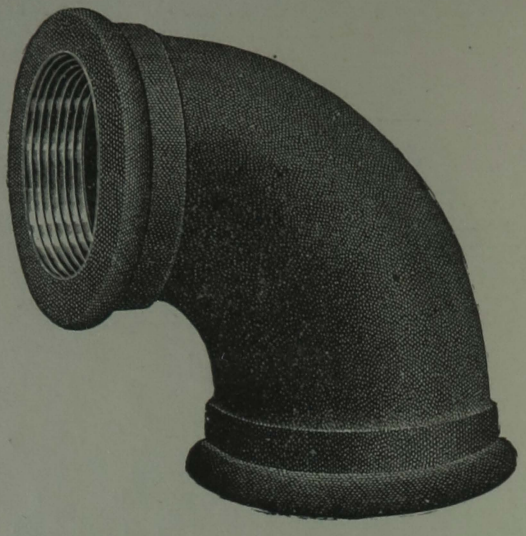
PLUGS.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Price.....Each,	$0 02	0 02	0 02	0 03	0 04	0 05	0 07	0 10	0 18	0 25
Countersunk .....Each,	.....	....	04	06	08	09	11	15	....	....
Galvanized.....Each,	04	04	04	06	08	10	14	20	36	50
Solid .....Each,	04	04	04	06	08	09	11	15	27	38
L. H.....Each,	.....	....	....	06	08	09	11	15	....	....

Size.....Inches,	3½	4	4½	5	6	7	8	9	10	12
Price.....Each,	$0 38	0 42	0 65	0 88	1 20	1 85	2 75	3 25	3 75	5 00
Galvanized.....Each,	76	84	1 30	1 75	2 40	3 70	5 50	6 50	7 50	10 00
Solid .....Each,	57	63	1 00	1 35	1 80	2 80	4 15	5 00	5 75	7 50

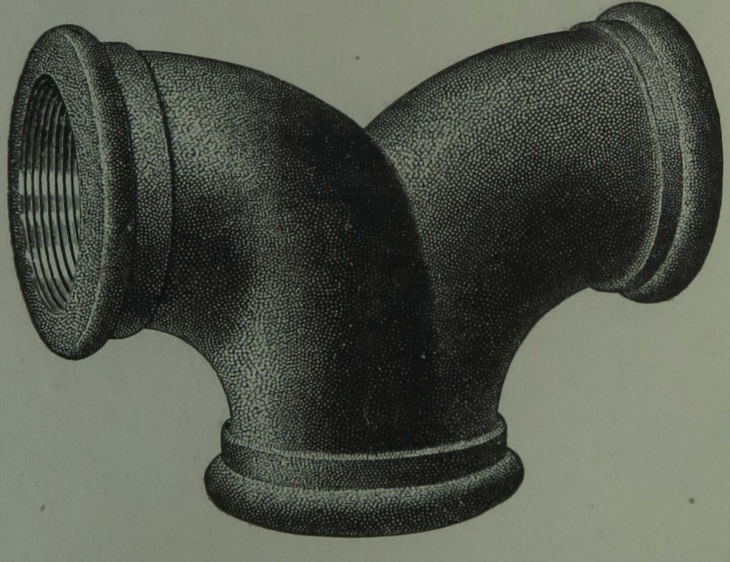
CAST IRON PIPE FITTINGS—Continued.



LONG RADIUS ELLS.

LIST.

Size.....Inches,	1	1¼	1½	2	2½	3	3½	4	4½
Price.....Each,	$0 25	0 35	0 45	0 60	1 00	1 50	2 00	2 50	3 50
Size.....Inches,	5	6	7	8	9	10	12	14	....
Price.....Each,	$4 50	6 50	10 00	14 00	17 00	20 00	30 00	45 00	....



LONG RADIUS DOUBLE BRANCH ELLS.

LIST.

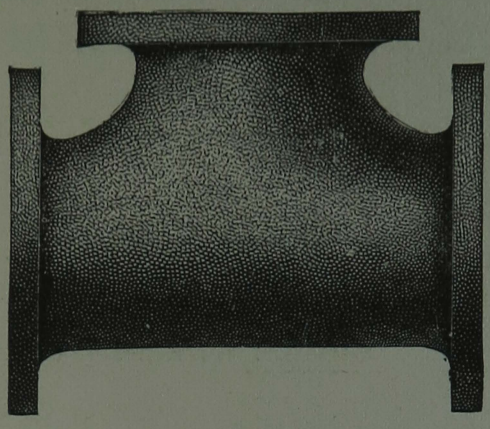
Size .....Inches,	1	1¼	1½	2	2½	3	3½	4	4½
Price.....Each,	$0 38	0 52	0 68	0 90	1 50	2 25	3 00	3 75	5 25
Size.....Inches,	5	6	7	8	9	10	12	14	....
Price .....Each,	$6 75	9 75	15 00	21 00	25 00	30 00	45 00	67 00	....

LONG RADIUS TEES.

LIST.

Size.....Inches,	1	1¼	1½	2	2½	3	3½	4	4½
Price.....Each,	$0 38	0 52	0 68	0 90	1 50	2 25	3 00	3 75	5 25
Size.....Inches,	5	6	7	8	9	10	12	14	....
Price.....Each,	$6 75	9 75	15 00	21 00	25 00	30 00	45 00	67 00	....

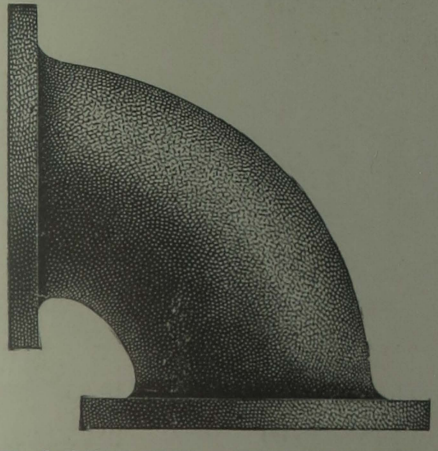
CAST IRON PIPE FITTINGS—Continued.



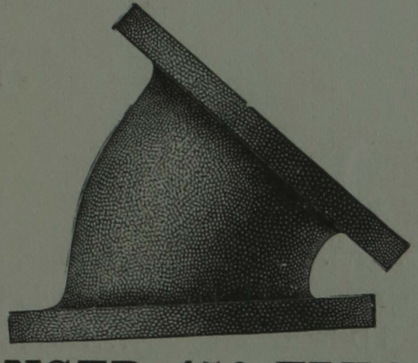
DOUBLE LONG RADIUS FLANGED TEES.

LIST.

Size. Inches.	Center to Face. Inches.	Face to Face. Inches.	Diameter of Flanges. Inches.	STRAIGHT SIZES. PRICE. With Faced Flanges. Each.	STRAIGHT SIZES. PRICE. With Faced and Drilled Flanges. Each.
4	6	12	9	$ 9 00	$ 10 50
5	7	14	10	12 50	14 00
6	7½	15	11	17 00	19 00
7	8½	17	13	23 00	26 00
8	9½	19	14	29 50	32 50
9	10¾	21½	15	36 50	40 50
10	11½	23	16	44 00	48 00
12	12¾	25½	19	57 00	61 00
14	13¼	26½	21	85 00	93 00
15	14½	29	22	100 00	108 00
16	15¼	30½	24	120 00	128 00
18	16½	33	25	150 00	165 00
20	18	36	27	185 00	200 00



FLANGED ELBOWS.



FLANGED 45° ELBOWS.

LIST.

Size.....Inches,	2	2½	3	3½	4	4½	5	6	7	8
Faced only .....Each,	$ 4 75	5 00	5 75	6 50	7 25	9 00	9 75	12 00	16 00	20 00
Faced and Drilled...Each,	5 75	6 25	7 00	7 75	9 25	11 00	11 75	14 00	19 75	23 75
45° Faced only.....Each,	5 25	5 50	6 25	7 25	8 00	10 00	10 75	13 00	16 00	20 00
45° Faced and Drl'd.Each,	6 25	6 75	7 50	8 50	10 00	12 00	12 75	15 00	19 75	23 75

Size.....Inches,	9	10	12	14	15	16	18	20	22	24
Faced only .....Each,	$26 00	32 00	44 00	58 00	72 00	84 00	108 00	135 00	160 00	200 00
Faced and Drilled ..Each,	30 00	36 00	50 00	65 00	80 00	93 00	118 00	148 00	180 00	220 00
45° Faced only .....Each,	26 00	32 00	44 00	58 00	72 00	84 00	108 00	135 00	160 00	200 00
45° Faced and Drl'd.Each,	30 00	36 00	50 00	65 00	80 00	93 00	118 00	148 00	180 00	220 00

CAST IRON PIPE FITTINGS—Continued.

FLANGED TEES.

SINGLE SWEEP.

LIST.

Size ..... Inches,	2	2½	3	3½	4	4½	5	6
Faced only ..... Each,	$ 8 00	8 25	9 50	11 00	12 00	15 00	16 25	20 00
Faced and Drilled ..... Each,	9 50	10 00	11 25	12 75	15 00	18 00	19 25	23 00
Reducing, Faced only ..... Each,	9 25	9 50	11 00	12 50	13 75	17 25	18 75	23 00
Reducing, Faced and Drilled..... Each,	10 75	11 25	12 75	14 25	16 75	20 25	21 75	26 00

Size ..... Inches,	7	8	9	10	12	14	15	16
Faced only ..... Each,	$26 50	33 50	43 50	53 50	74 00	96 00	120 00	140 00
Faced and Drilled ..... Each,	32 00	39 00	50 00	60 00	83 00	107 00	132 00	153 00
Reducing, Faced only ..... Each,	30 00	38 50	50 00	61 50	85 00	110 00	138 00	160 00
Reducing, Faced and Drilled..... Each,	35 50	44 00	56 50	68 00	94 00	121 00	150 00	173 00

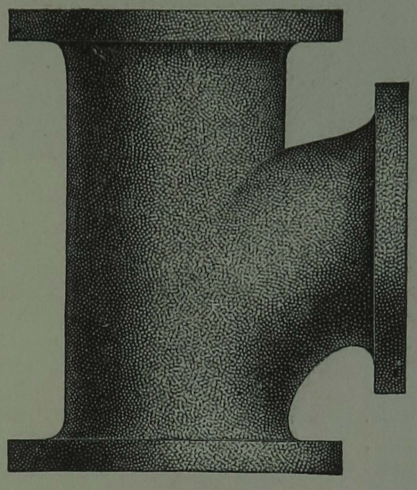
DOUBLE SWEEP.

LIST.

Size ..... Inches,	2	2½	3	3½	4	4½	5	6
Faced only ..... Each,	$ 8 00	8 25	9 50	11 00	12 00	15 00	16 25	20 00
Faced and Drilled ..... Each,	9 50	10 00	11 25	12 75	15 00	18 00	19 25	23 00
Reducing, Faced only ..... Each,	9 25	9 50	11 00	12 50	13 75	17 25	18 75	23 00
Reducing, Faced and Drilled..... Each,	10 75	11 25	12 75	14 25	16 75	20 25	21 75	26 00

Size ..... Inches,	7	8	9	10	12	14	15	16
Faced only ..... Each,	$26 50	33 50	43 50	53 50	74 00	96 00	120 00	140 00
Faced and Drilled ..... Each,	32 00	39 00	50 00	60 00	83 00	107 00	132 00	153 00
Reducing, Faced only ..... Each,	30 00	38 50	50 00	61 50	85 00	110 00	138 00	160 00
Reducing, Faced and Drilled..... Each,	35 50	44 00	56 50	68 00	94 00	121 00	150 00	173 00

CAST IRON PIPE FITTINGS—Continued.



Flanged.

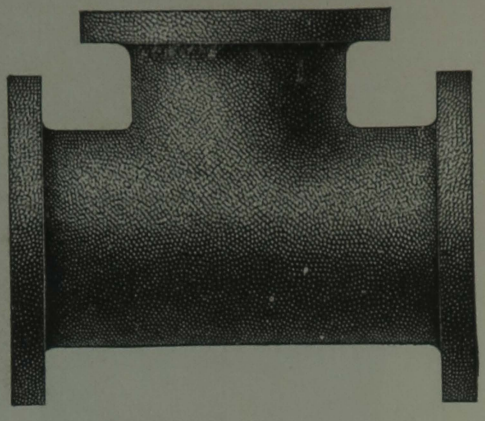
LONG RADIUS TEES.

LIST.

Size. Inches.	Center to Face. Inches.	Face to Face. Inches.	Diameter of Flanges. Inches.	STRAIGHT SIZES. PRICE. With Faced Flanges. Each.	STRAIGHT SIZES. PRICE. With Faced and Drilled Flanges. Each.	Size. Inches.	REDUCING SIZES. PRICE. With Faced Flanges. Each.	REDUCING SIZES. PRICE. With Faced and Drilled Flanges. Each.
2	4½	9	6½	$ 7 00	$ 8 00	4	$ 10 50	$ 12 00
3	5½	11	8	8 00	9 00	4½	12 00	13 50
4	6	12	9	9 50	10 50	5	14 00	15 50
4½	6¼	12½	9½	11 00	12 50	6	19 00	21 00
5	7	14	10	12 50	14 00	7	25 50	28 50
6	7½	15	11	17 00	19 00	8	33 00	36 00
7	8½	17	13	23 00	26 00	9	41 00	45 00
8	9½	19	14	29 50	32 50	10	49 00	53 00
9	10¾	21½	15	36 50	40 50	12	63 00	67 00
10	11½	23	16	44 00	48 00	14	94 00	102 00
12	12¾	25½	19	57 00	61 00	15	110 00	118 00
14	13¼	26½	21	85 00	93 00	16	132 00	140 00
15	14½	29	22	100 00	108 00	18	170 00	185 00
16	15¼	30½	24	120 00	128 00	20	205 00	220 00
18	16½	33	25	150 00	165 00	22	245 00	270 00
20	18	36	27	185 00	200 00	24	315 00	355 00
22	20	40	30	225 00	250 00	..	.....	.....
24	22	44	32	285 00	325 00	..	.....	.....

NOTE.—Flanged Fittings will always be furnished *faced only*, unless otherwise ordered.

CAST IRON PIPE FITTINGS—Continued.

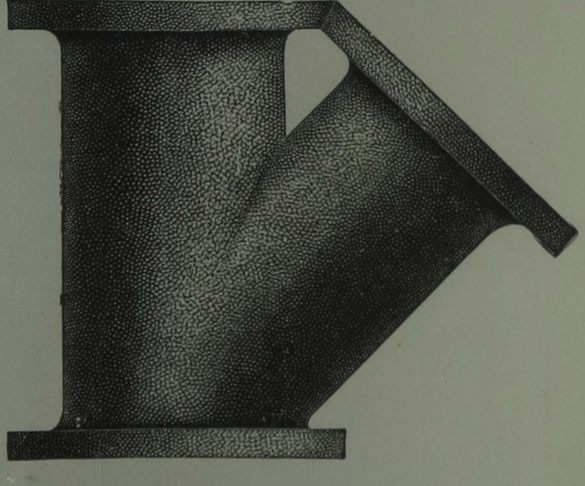


FLANGED TEES.

LIST.

Size.....Inches,	2	2½	3	3½	4	4½	5	6
Faced only.....Each,	$ 7 00	7 25	8 25	9 50	10 50	13 00	14 25	17 50
Faced and Drilled.. .....Each,	8 50	9 00	10 00	11 25	13 50	16 00	17 25	20 50
Reducing, Faced only..... ...Each,	8 00	8 25	9 50	11 00	12 00	15 00	16 25	20 00
Reducing, Faced and Drilled...Each,	9 50	10 00	11 25	12 75	15 00	18 00	19 00	23 00

Size.....Inches,	7	8	9	10	12	14	15	16
Faced only.....Each,	$23 00	29 00	38 00	46 50	64 00	84 00	105 00	122 00
Faced and Drilled.....Each,	28 75	34 75	44 00	52 50	73 00	95 00	117 00	135 00
Reducing, Faced only.....Each,	26 50	33 50	43 50	53 50	74 00	96 00	120 00	140 00
Reducing, Faced and Drilled...Each,	32 00	39 00	50 00	60 00	83 00	107 00	132 00	153 00



Y BRANCHES.

LIST.

Size.....Inches,	2	2½	3	3½	4	4½	5	6
Faced only.....Each,	$ 9 50	10 00	11 50	13 00	14 50	18 00	19 50	24 00
Faced and Drilled.....Each,	11 50	12 50	14 00	15 50	18 50	22 00	23 50	28 00
Reducing, Faced only..... Each,	11 00	11 50	13 25	15 00	16 75	20 75	22 50	27 50
Reducing, Faced and Drilled...Each,	13 00	14 00	15 75	17 50	20 75	25 00	26 50	31 50

Size.....Inches,	7	8	9	10	12	14	15	16
Faced only.....Each,	$32 00	40 00	52 00	64 00	88 00	116 00	144 00	168 00
Faced and Drilled.....Each,	39 50	47 50	60 00	72 00	100 00	130 00	160 00	186 00
Reducing, Faced only.....Each,	37 00	46 00	60 00	74 00	100 00	132 00	165 00	193 00
Reducing, Faced and Drilled...Each,	45 00	53 50	68 00	82 00	112 00	146 00	180 00	210 00

CAST IRON PIPE FITTINGS—Continued.

FLANGED CROSSES.

LIST.

Size.....Inches,	2	2½	3	3½	4	4½	5	6
Faced only.....Each,	$ 9 50	10 00	11 50	13 00	14 50	18 00	19 50	24 00
Faced and Drilled.....Each,	11 50	12 50	14 00	15 50	18 50	22 00	23 50	28 00
Reducing, Faced only.....Each,	11 00	11 50	13 25	15 00	16 75	20 75	22 50	27 50
Reducing, Faced and Drilled...Each,	13 00	14 00	15 75	17 50	20 75	25 00	26 50	31 50

Size.....Inches,	7	8	9	10	12	14	15	16
Faced only.....Each,	$32 00	40 00	52 00	64 00	88 00	116 00	144 00	168 00
Faced and Drilled.....Each,	39 50	47 50	60 00	72 00	100 00	130 00	160 00	186 00
Reducing, Faced only.....Each,	37 00	46 00	60 00	74 00	100 00	132 00	165 00	193 00
Reducing, Faced and Drilled .Each,	45 00	53 50	68 00	82 00	112 00	146 00	180 00	210 00

FLANGES.

LIST.

Size.....Inches,	2	2½	3	3½	4	4½	5	6
Faced only.....Each,	$ 1 20	1 40	1 60	1 80	2 15	2 50	2 80	3 20
Faced and Drilled.....Each,	1 50	2 00	2 25	2 50	3 00	3 35	3 65	4 00
Solid, Faced only.....Each,	1 40	1 60	1 85	2 10	2 50	2 90	3 25	3 70
Solid, Faced and Drilled.....Each,	1 70	2 20	2 50	2 80	3 35	3 75	4 10	4 50

Size.....Inches,	7	8	9	10	12	14	15	16
Faced only.....Each,	$ 4 35	5 00	6 75	7 75	10 50	13 75	18 00	22 50
Faced and Drilled .....Each,	5 75	6 50	8 25	9 25	12 50	16 00	21 00	26 00
Solid, Faced only.....Each,	5 00	5 75	7 75	9 00	14 00	17 50	22 50	28 00
Solid, Faced and Drilled.....Each,	6 40	7 25	9 25	10 60	16 00	19 75	25 50	31 50

The above prices for Flanges, are for Flanges of the same outside diameter, as that of regular Flanges, on the Flange Fittings.

CAST IRON PIPE FITTINGS—Continued.

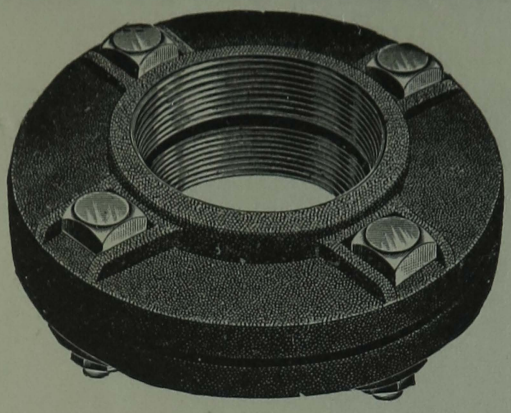
FLANGES.

LIST.

Diameter. Flanges.	SIZE, INCHES.									
	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2
3	$0 10	$ 10	....	....	....	....	....	....	....	....
3 1/2	15	15	$ 15	$ 15	$ 16	....	....	....	....	....
4	22	22	22	16	16	....	....	....	....	....
4 1/2	25	25	25	25	25	$ 22	....	....	....	....
5	35	35	30	30	30	30	$ 35	....	....	....
5 1/2	45	45	45	40	40	40	35	$ 40	....	....
6	50	50	50	42	40	40	42	42	$ 50	....
6 1/2	....	65	60	60	60	55	50	50	50	$ 65
7	....	75	75	75	70	70	62	62	62	75
7 1/2	....	90	90	90	85	85	80	80	75	85
8	....	1 00	1 00	1 00	95	95	90	90	90	90
8 1/2	....	1 25	1 25	1 25	1 15	1 15	1 10	1 10	1 10	1 00
9	....	....	....	1 35	1 35	1 35	1 30	1 25	1 15	1 15
9 1/2	....	....	....	....	1 90	1 90	1 75	1 75	1 60	1 60
10	....	....	....	....	2 25	2 25	2 15	2 00	1 80	1 50
11	....	....	....	....	....	....	2 50	2 50	2 25	2 25
12	....	....	....	....	....	....	....	3 00	3 00	2 75
13	....	....	....	....		....	....	....	3 50	3 50
14	....	....	....		....	....	....	....	4 00	4 00
15	....	....	....	....	....	....	....	....	....	....
16	....	....	....	....		....	....	....	....	....
17	....	....	....	....	....	....	....	....	....	....
18	....	....	....	....	....	....	....	....	....	....
19	....	....	....	....	....	....	....	....	....	....
20	....	....	....	....	....	....	....	....	....	....
21	....	....	....		....	....	....	....	....	....

Diameter Flanges.	SIZE, INCHES.									
	4	4 1/2	5	6	7	8	9	10	12	14
3	....	....	....	....	....	....	....	....	....	....
3 3/8	....	....	....	....	....	....	....	....	....	....
4	....	....	....	....	....	....	....	....		....
4 1/2	....	....	....	....		....	....	....	....	....
5	....	....	....	....	....	....	....	....	....	....
5 1/2	....	....	....	....	....	....	....	....	....	....
6	....	....	....	....	....	....	....	....	....	....
6 1/2	....	....	....	....	....	....	....	....	....	....
7	....	....	....	....	....	....	....	....	....	....
7 1/2	$ 90	....	....	....	....	....	....	....	....	....
8	90	....	....	....	....	....	....	....	....	....
8 1/2	1 00	....	....	....	....	....	....	....	....	....
9	1 15	$1 15	1 40		....	....	....	....	....	....
9 1/2	1 50	1 25	1 50	$1 50	....	....	....	....	....	....
10	1 50	1 50	1 50	1 50	....	....	....	....	....	....
11	2 00	1 75	1 75	1 75	$2 20	....	....	....	....	....
12	2 50	2 50	2 20	2 20	2 20	$2 80	....	....	....	....
13	3 25	3 00	3 00	2 80	2 80	2 80	....	....		....
14	3 75	3 75	3 50	3 25	3 25	3 25	$3 75	$4 00	....	....
15	....	....	....	....	4 00	4 00	4 00	4 50	....	....
16	....	....	....	....	5 00	5 00	5 00	5 00	$6 00	....
17	....	....	....	....	6 50	6 50	5 75	5 75	7 00	....
18	....	....	....	....	....	8 00	8 00	7 00	7 00	....
19	....	....	....	....	....	....	....	7 50	7 50	....
20	....	....	....	....	....	....	....	....	8 50	$8 50
21	....	....	....	....	....	....	....	....	....	9 50

CAST IRON PIPE FITTINGS—Continued.



FLANGE UNIONS.

WITH RUBBER GASKET.

LIST

Size ..... Inches,	½	¾	1	1¼	1½	2	2½	3	3½
Price ..... Each,	$0 40	0 46	0 52	0 64	0 78	1 00	1 25	1 50	1 80
Lip ..... Each,	60	75	90	1 00	1 20	1 50	1 75	2 00	2 75
Galvanized Lip ..... Each,	1 00	1 25	1 50	1 65	2 00	2 50	2 90	3 35	4 55
Galvanized ..... Each,	80	92	1 04	1 28	1 56	2 00	2 50	3 00	3 60

Size ..... Inches,	4	4½	5	6	7	8	9	10	12
Price ..... Each,	$2 10	2 70	3 15	3 95	5 50	7 00	10 00	11 50	16 00
Lip ..... Each,	3 00	3 50	4 00	5 00	7 00	10 00	15 00	17 50	20 00
Galvanized Lip ..... Each,	5 00	5 85	6 65	8 35	11 65	16 65	25 00	29 00	34 00
Galvanized ..... Each,	4 20	5 40	6 30	7 90	11 00	14 00	20 00	23 00	32 00

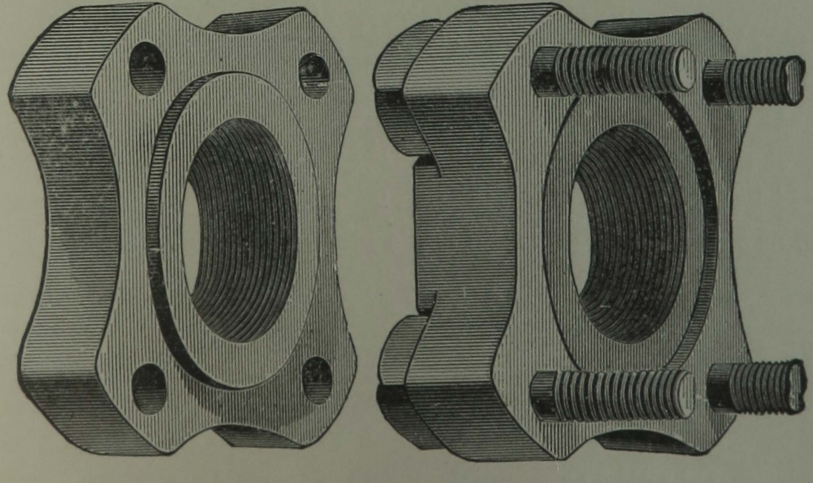
FACED. NO PACKING.

FOR A WORKING PRESSURE OF 200 POUNDS.

LIST.

Size ..... Inches,	¾	1	1¼	1½	2	2½	3
Diameter of Flanges ..... Inches,	3¼	3⅝	4⅛	4⅞	5⅜	6	6¾
Number of Bolts in each	4	4	4	4	5	5	6
Price ..... Each.	$0 65	0 70	0 85	1 15	1 50	1 75	2 25

Size ..... Inches,	3½	4	4½	5	6	7	8
Diameter of Flanges ..... Inches,	7⅛	8	8⅝	9⅜	10¾	12	13¼
Number of Bolts in each	6	7	8	8	9	10	10
Price ..... Each,	$2 75	3 15	4 50	5 00	6 50	8 00	10 00

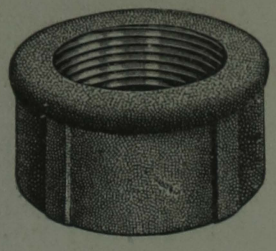


DAME'S FLANGE UNIONS.

LIST.

Size..Inches,	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	10	12
Price...Each,	$0 70	0 85	1 15	1 50	1 75	2 25	2 75	3 15	4 50	5 00	6 50	8 00	10 00	15 00	22 00

CAST IRON PIPE FITTINGS—Continued.



CAPS.

LIST.

Size.....Inches,	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Price.....Each,	$0 26	0 40	0 54	0 75	0 87	1 05	1 20	1 55	2 50	2 85	4 75	5 50	7 00
Galvanized.....Each,	52	80	1 08	1 50	1 74	2 10	2 40	3 10	5 00	5 70	9 50	11 00	14 00

LOCK NUTS.

LIST.

Size.....Inches,	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Price.....Each,	$0 25	0 27	0 34	0 47	0 64	0 85	0 90	1 30	1 70	2 35	2 70	3 00	4 00
Galvanized.....Each,	50	54	68	94	1 28	1 70	1 80	2 60	3 40	4 70	5 40	6 00	8 00

FLOOR PLATES.

LIST.

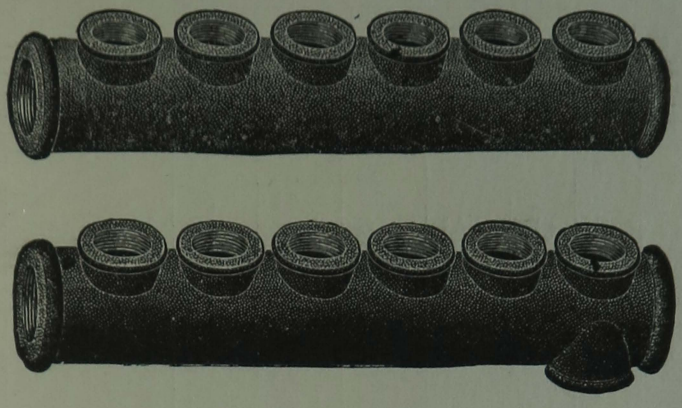
Size.....Inches,	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price.....Each,	$0 06	0 06	0 08	0 11	0 14	0 16	0 24	0 30	0 35	0 42	....	0 60	0 75

CEILING PLATES.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price.....Each,	$0 11	0 13	0 16	0 18	0 23	0 27	0 36	0 50	0 55	0 68	....	0 95	1 25

CAST IRON PIPE FITTINGS—Continued.



BRANCH TEES.

LIST.

Number of Branches		1	2	3	4	5	6	7	8
1 inch, 1 or 1¼-inch run	Each,	.....	$ 90	1 05	1 15	1 35	1 60	1 90	2 20
1-inch, 1½-inch run	Each,	.....	1 00	1 15	1 30	1 45	1 75	2 20	2 45
1-inch, 2-inch run	Each,	.....	1 15	1 35	1 60	1 85	2 10	2 45	2 75
1-inch, 2½-inch run	Each,	.....	1 75	2 05	2 40	2 75	3 10	3 50	3 75
1¼-inch, 1¼ or 1½-inch run	Each,	.....	1 30	1 65	2 00	2 40	2 80	3 20	3 60
1¼-inch, 2-inch run	Each,	.....	1 50	1 90	2 40	2 90	3 30	3 90	4 50
1¼-inch, 2½-inch run	Each,	.....	1 95	2 40	2 85	3 55	3 95	4 20	4 95
1½-inch, 1½ or 2-inch run	Each,	.....	2 10	2 70	3 35	4 00	4 65	5 25	5 85
1½-inch, 2½-inch run	Each,	.....	2 85	3 45	4 15	5 00	5 75	6 50	7 00
1½-inch, 3-inch run	Each,	.....	3 15	3 80	4 60	5 50	6 25	7 25	7 75
2-inch, 2-inch run	Each,	.....	4 10	5 25	6 40	7 65	8 80	10 60	11 50
2-inch, 2½-inch run	Each,	.....	4 50	5 75	7 00	8 50	9 75	11 75	12 75
2-inch, 3-inch run	Each,	.....	4 50	5 75	7 00	8 50	9 75	11 75	12 75
2-inch, 3½-inch run	Each,	.....	5 00	6 25	7 75	9 25	10 75	13 00	14 00

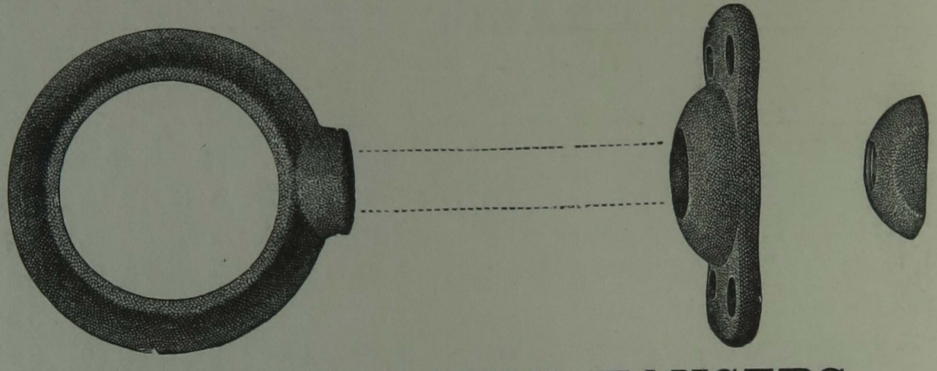
Number of Branches		9	10	11	12	13	14	15	16
1-inch, 1 or 1¼-inch run	Each,	$ 2 65	3 15	3 75	4 40	5 00	....	....	....
1-inch, 1½-inch run	Each,	2 90	3 30	4 50	4 75	5 50	7 00	7 50	8 00
1-inch, 2-inch run	Each,	3 40	4 00	4 80	5 10	6 00	7 25	7 75	8 25
1-inch, 2½-inch run	Each,	4 30	5 00	5 50	5 85	6 30	....	....	....
1¼ inch, 1¼ or 1½-inch run	Each,	4 30	4 80	5 00	5 25	6 00	....	....	....
1¼-inch, 2-inch run	Each,	5 25	5 85	6 25	6 50	7 00	....	....	....
1¼-inch, 2½-inch run	Each,	6 15	6 85	7 25	7 65	8 25	....	....	....
1½-inch, 1½ or 2-inch run	Each,	6 50	7 60	8 00	8 50	9 50	....	....	....
1½-inch, 2½-inch run	Each,	8 25	9 25	9 75	10 50	11 50	....	....	....
1½-inch, 3-inch run	Each,	9 00	10 00	10 75	11 50	12 75	....	....	....
2-inch, 2-inch run	Each,	12 25	13 50	14 25	15 00	16 00	....	....	....
2-inch, 2½-inch run	Each,	13 50	15 00	15 75	16 50	17 50	....	....	....
2-inch, 3-inch run	Each,	13 50	15 00	15 75	16 50	17 50	....	....	....
2-inch, 3½-inch run	Each,	15 00	16 50	.....	.....	.....	....	....	....

CAST IRON PIPE FITTINGS—Continued.

HOOK PLATES.

LIST.

Number of Branches....	1	2	3	4	5	6	7	8	9	10	11	12
¾-inch.....Each	$0 08	$0 16	$0 21	$0 24	$ 28	$ 34	$ 40	$ 45	$ 50	$ 56	$ 68	$ 72
1-inch ....Each	09	18	23	26	32	38	48	59	65	70	85	1 00
1¼-inch.....Each	10	21	27	32	41	52	68	80	90	1 20	1 35	1 40
1½-inch.....Each	15	28	43	58	72	88	1 10	1 25	1 40	1 55	1 65	1 90
2-inch..... .....Each	22	43	65	90	1 15	1 35	.....	.....	.....	.....	.....	.....
¾-in. Expansion...Each	12	23	34	45	55	65	77	90	1 05	1 25	1 45	1 65
1-in. Expansion....Each	15	25	35	50	60	70	80	95	1 10	1 35	1 55	1 70
1¼-in. Expansion..Each	17	27	40	60	70	80	90	1 15	1 30	1 50	1 70	2 00
1½-in. Expansion..Each	25	40	60	75	90	1 00	.....	.....	.....	.....	.....	.....
1-in. Ring Plates..Each	16	28	41	50	62	72	96	1 00	1 20	1 30	.....	.....
1¼-in. Ring Plates.Each	21	35	50	62	75	1 10	1 25	1 40	.....		....	.....

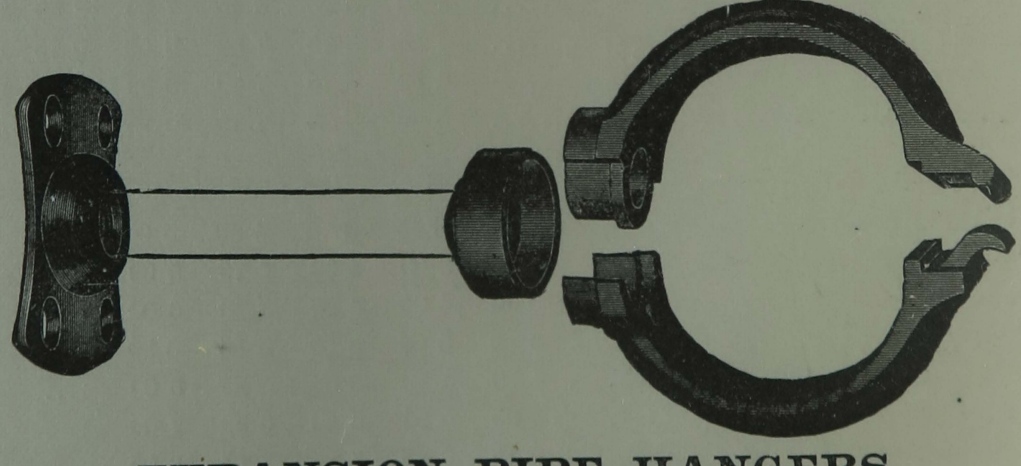


EXPANSION PIPE HANGERS

OR RING HOOKS.

LIST.

Size.....Inches,	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8
Price.....Each,	$0 17	0 18	0 19	0 25	0 29	0 36	0 44	0 55	0 63	0 90	1 12	1 35	1 80	2 25

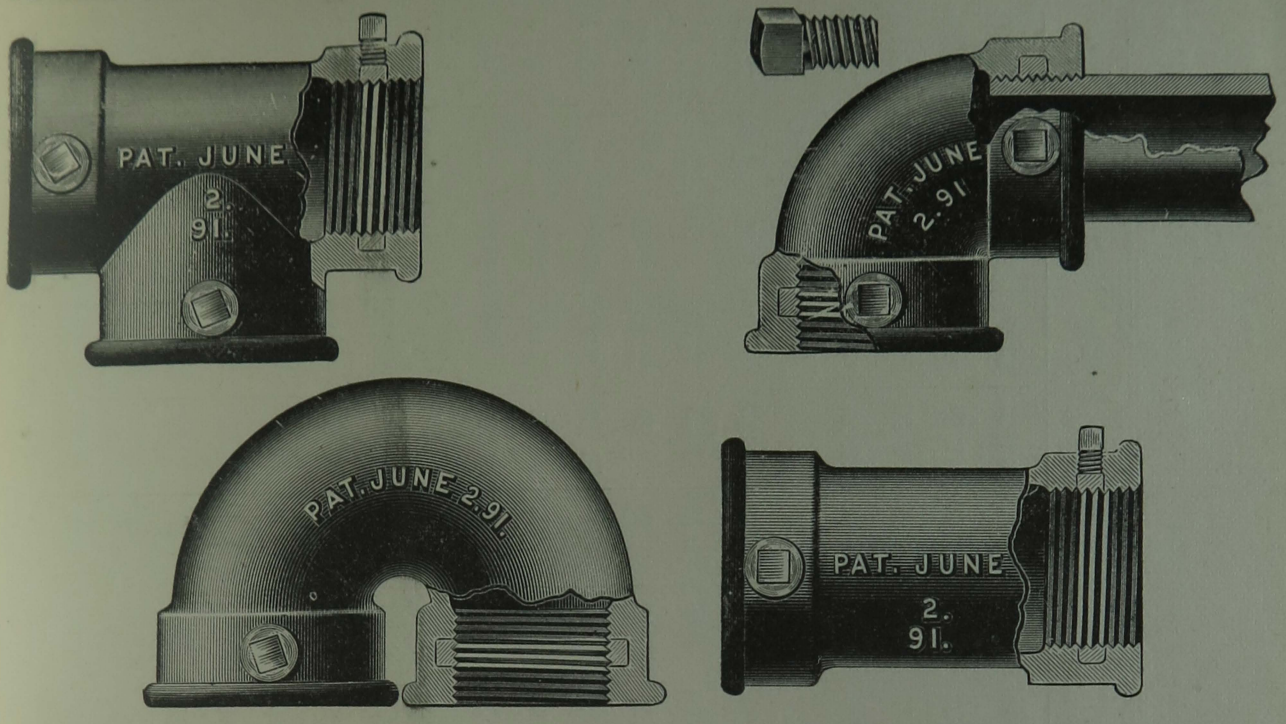


EXPANSION PIPE HANGERS.

SECTIONAL PATTERN.

LIST.

Size.....Inches	¾	1	1¼	1½	2	2½	3	3½	4	5	6
Price.....Each	$0 22	$0 25	$0 30	$0 38	$0 44	$0 55	$0 65	$0 90	$1 15	$1 50	$2 25
Size of pipe, rings and buttons are tapped for, Inches.....	⅛	⅛	¼	⅜	⅜	⅜	½	½	½	¾	¾



Sectional Views of Tees, Elbows, Return Bends and Couplings.

TIGHT JOINT FITTINGS.

(Folly's Patent.)

LIST.

¼ inch Straight Elbows	$ 28
⅜ inch Straight Elbows	35
½ inch Straight Elbows	43
¾ inch Straight Elbows	48
1 inch Straight Elbows	64
1¼ inch Straight Elbows	75
1½ inch Straight Elbows	95
2 inch Straight Elbows	1 28
2½ inch Straight Elbows	1 97
3 inch Straight Elbows	2 50
3½ inch Straight Elbows	3 09
4 inch Straight Elbows	3 54
5 inch Straight Elbows	4 96
6 inch Straight Elbows	6 26
¼ inch Right and Left Elbows	31
⅜ inch Right and Left Elbows	39
½ inch Right and Left Elbows	48
¾ inch Right and Left Elbows	53
1 inch Right and Left Elbows	71
1¼ inch Right and Left Elbows	83
1½ inch Right and Left Elbows	1 05
2 inch Right and Left Elbows	1 41
½ x ¼ inch Reducing Elbows	50
½ x ⅜ inch Reducing Elbows	53
¾ x ¼ inch Reducing Elbows	56
¼ inch Straight Tees	42
⅜ inch Straight Tees	48
½ inch Straight Tees	56
¾ inch Straight Tees	66
1 inch Straight Tees	93
1¼ inch Straight Tees	1 17
1½ inch Straight Tees	1 36
2 inch Straight Tees	1 81
2½ inch Straight Tees	2 85
3 inch Straight Tees	$3 36
3½ inch Straight Tees	3 89
4 inch Straight Tees	4 72
5 inch Straight Tees	6 45
6 inch Straight Tees	8 34

	Distance From Center to Center. Inches.	
½ inch Straight Return Bends,	1¾	$ 59
¾ inch Straight Return Bends,	2	69
1 inch Straight Return Bends,	2⅜	98
1 inch Straight Return Bends,	3	1 05
1¼ inch Straight Return Bends,	3	1 23
1¼ inch Straight Return Bends,	4	1 30
1½ inch Straight Return Bends,	3	1 40
1½ inch Straight Return Bends,	3¼	1 43
1½ inch Straight Return Bends,	4½	1 53
1½ inch Straight Return Bends,	5½	1 63
1½ inch Straight Return Bends,	6	1 68
1½ inch Straight Return Bends,	8	1 75
2 inch Straight Return Bends,	4	1 90
2 inch Straight Return Bends,	5½	2 15
2 inch Straight Return Bends,	6	2 25

	Distance From Center to Center. Inches.	
½ inch Right and Left Return Bends,	1¾	$ 65
¾ inch Right and Left Return Bends,	2	76
1 inch Right and Left Return Bends,	2⅜	1 08
1 inch Right and Left Return Bends,	3	1 16
1¼ inch Right and Left Return Bends,	3	1 36
1¼ inch Right and Left Return Bends,	4	1 43
1½ inch Right and Left Return Bends,	3	1 54
1½ inch Right and Left Return Bends,	3¼	1 58

BRASS FITTINGS.

LIST.

Size ..... Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Elbows, Rough ..... Each	$0 12	$0 17	$0 21	$0 28	$ 35	$ 50	$ 85	$1 10	$1 50	$3 50	$4 50	$7 00	$10 00
Reducing Elbows, Rough ..... Each	....	22	26	35	45	62	1 10	1 40	1 90	4 40	5 65	8 75	12 50
Tees, Rough ..... Each	15	20	30	40	50	75	1 00	1 30	1 75	4 00	5 50	9 00	13 00
Reducing Tees, Rough ..... Each	....	25	38	50	63	95	1 25	1 65	2 20	5 00	6 90	11 25	16 25
Crosses, Rough ..... Each	....	30	40	50	60	80	1 50	2 00	3 50	5 00	7 00	10 00	14 50
Reducing Crosses, Rough ..... Each	....	38	50	65	75	1 00	1 90	2 50	4 40	6 25	8 75	12 50	18 00
Reducing Couplings, Rough ..... Each	....	16	22	32	45	65	90	1 12	1 85	3 00	4 50	.....	.....
Plugs, Rough ..... Each	9	10	12	15	20	28	40	50	90	1 25	2 00	3 00	4 00
Caps, Rough ..... Each	15	15	20	25	35	45	60	80	1 10	2 00	3 00	.....	.....
Locknuts, Rough ..... Each	....	10	12	15	20	30	45	70	95	1 50	2 75	.....	.....
Bushings, Rough ..... Each	....	10	12	14	21	38	50	67	1 00	1 50	2 50	.....	.....
Street Elbows, Rough. ..... Each	....	....	....	55	75	1 00	1 80	....	....	....	....	.....	.....
Couplings, Rough. ..... Each	10	14	16	25	37	50	60	90	1 35	2 40	3 50	.....	.....
Couplings, R. and L, Rough ..... Each	....	17	20	30	45	60	75	1 12	1 75	....	....	.....	.....
Ground Joint Unions, Rough ..... Each	35	40	55	75	1 00	1 40	1 90	2 75	4 00	6 50	8 50	.....	.....
Close Nipples ..... Each	12	15	20	25	30	40	60	90	1 25	2 50	3 50	.....	.....
Long Nipples ..... Each	15	20	30	35	45	60	90	1 25	1 60	3 00	4 50	.....	.....
Elbows, Finished ..... Each	24	34	42	56	70	1 00	1 70	2 20	3 00	7 00	9 00	14 00	20 00
Reducing Elbows, Finished ..... Each	....	44	52	70	90	1 25	2 20	2 80	3 80	8 80	11 30	17 50	25 00

BRASS FITTINGS—Continued.

LIST.

Size ..... Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Tees, Finished ..... Each	$0 30	$0 40	$ 60	$ 80	$1 00	$1 50	$2 00	$2 60	$3 50	$ 8 00	$11 00	$18 00	$26 00
Reducing Tees, Finished ..... Each	....	50	76	1 00	1 25	1 90	2 50	3 30	4 40	10 00	13 80	22 50	32 50
Crosses, Finished ..... Each	....	60	80	1 00	1 20	1 60	3 00	4 00	7 00	10 00	14 00	20 00	29 00
Reducing Crosses, Finished ..... Each	....	75	1 00	1 30	1 50	2 00	3 80	5 00	8 80	12 50	17 50	25 00	36 00
Reducing Couplings, Finished ..... Each	....	32	44	64	90	1 30	1 80	2 25	3 70	6 00	9 00	....	....
Plugs, Finished ..... Each	18	20	24	30	40	56	80	1 00	1 80	2 50	4 00	6 00	8 00
Caps, Finished ..... Each	30	30	40	50	70	90	1 20	1 60	2 20	4 00	6 00	....	....
Locknuts, Finished ..... Each	....	20	24	30	40	60	90	1 40	1 90	3 00	5 50	....	....
Bushings, Finished ..... Each	....	20	24	28	42	76	1 00	1 35	2 00	3 00	5 00	....	....
Street Elbows, Finished ..... Each	....	....	....	83	1 10	1 50	2 65	....	....	....	....	....	....
Couplings, Finished ..... Each	20	28	32	50	75	1 00	1 20	1 80	2 70	4 80	7 00	....	....
Couplings, R. and L., Finished ..... Each	....	31	36	55	82	1 10	1 35	2 00	3 10	....	....	....	....
Ground Joint Unions, Finished ..... Each	32	36	50	70	90	1 25	1 70	2 50	3 60	6 00	7 75	....	....

SEAMLESS DRAWN BRASS TUBING.

IRON PIPE SIZE.

LIST.

Size ..... Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Weight per Foot ..... Pounds	1/3	1/2	5/8	8/10	1 1/4	1 7/10	2 1/2	2 3/4	3 1/2	4 3/4	8 1/2	11	12 3/4
Length ..... Feet	12	12	12	12	12	12	12	12	12	12	12	12	12

PRICES ON APPLICATION.

IRON BODY EXPANSION JOINTS.

LIST.

Size.....	Inches,	2	2½	3	3½	4	5
Flanged.....	Each,	$15 00	16 00	18 50	25 00	30 00	48 00
Traverse.....	Inches,	2½	2½	2¾	3	3¼	4
Size.....	Inches,	6	7	8	9	10	12
Flanged.....	Each,	$55 00	80 00	110 00	120 00	175 00	250 00
Traverse.....	Inches,	5	6	7	7	7	8

6-INCH TRAVERSE.

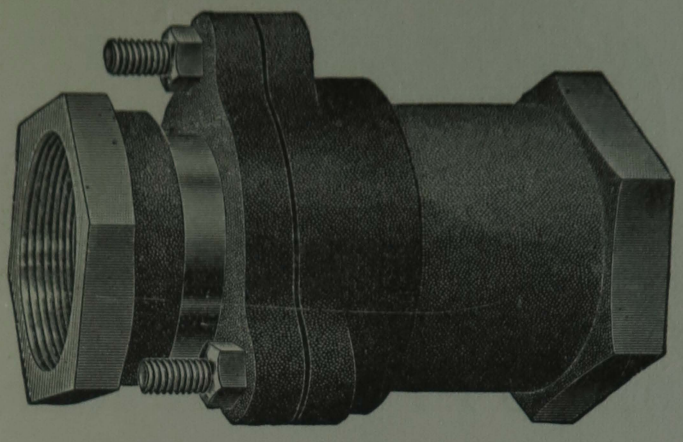
LIST.

Size.....Inches,	2	2½	3	3½	4	4½	5	6
Flanged...Each,	$18 00	20 00	25 00	35 00	40 00	50 00	55 00	65 00

SPECIAL TRAVERSE.

LIST.

TRAVERSE.	Size—Inches.....	2	2½	3	3½	4	5	6	7
6 Inches.....	Each.....	$18 00	$20 00	$25 00	$35 00	$40 00	$55 00	$65 00	.....
10 Inches.....	Each.....	23 00	26 00	32 50	45 00	52 00	72 00	90 00	$112 00
12 Inches.....	Each.....	25 50	29 00	36 50	50 00	58 00	80 00	102 50	127 00
14 Inches.....	Each.....	28 00	32 00	40 50	55 00	64 00	88 00	.....	.....
16 Inches.....	Each.....	30 50	35 00	44 50	60 00	70 00	96 00	.....	.....
18 Inches.....	Each.....	33 00	38 00	48 50	65 00	76 00	.....	.....	.....



IRON BODY EXPANSION JOINTS.

LIST.

Size.....Inches,	2	2½	3	3½	4	5
Screwed.....Each,	$7 00	8 00	10 00	14 00	18 00	38 00
Size.....Inches,	6	7	8	9	10	12
Screwed.....Each,	$45 00	70 00	100 00	110 00	160 00	225 00

6-INCH TRAVERSE.

LIST.

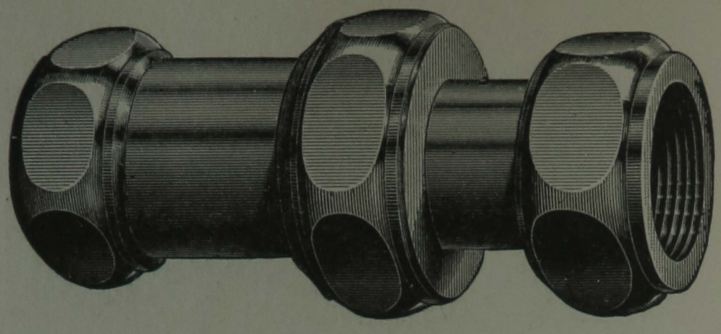
Size.....Inches,	2	2½	3	3½	4	4½	5	6
Screwed.....Each,	$11 00	13 00	17 50	25 00	30 00	40 00	45 00	55 00

SPECIAL TRAVERSE.

LIST.

TRAVERSE.	Size – Inches.....	2	2½	3	3½	4	5	6	7
6 Inches.....	Each.....	$11 00	$13 00	$17 50	$25 00	$30 00	$45 00	$55 00	.....
10 Inches.....	Each.....	16 00	19 00	25 00	35 00	42 00	62 00	80 00	$100 00
12 Inches.....	Each.....	18 50	22 00	29 00	40 00	48 00	70 00	92 50	115 00
14 Inches.....	Each.....	21 00	25 00	33 00	45 00	54 00	78 00	.....	.....
16 Inches.....	Each.....	23 50	28 00	37 00	50 00	60 00	86 00	.....	.....
18 Inches.....	Each.....	26 00	31 00	41 00	55 00	66 00	.....	.....	.....

When used for high pressure steam, the expansion is 1 inch in 50 feet of pipe.



BRASS EXPANSION JOINTS.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2	2½	3
Screwed, Eastern Traverse....Each,	$3 80	4 00	4 90	6 30	7 40	9 10	.....	.....
Screwed, Western Traverse...Each,	1 50	2 20	2 75	4 00	5 00	8 00	17 50	24 00

SPECIAL TRAVERSE.

LIST.

Size.....Inches,	¾	1	1¼	1½	2
Traverse, 6 inches.....Each,	$ 8 25	9 00	10 00	11 50	13 50
Traverse, 8 inches.....Each,	9 00	10 00	11 25	13 00	15 50
Traverse, 10 inches.....Each,	9 75	11 00	12 50	14 50	17 50
Traverse, 12 inches.....Each,	10 50	12 00	13 75	16 00	19 50

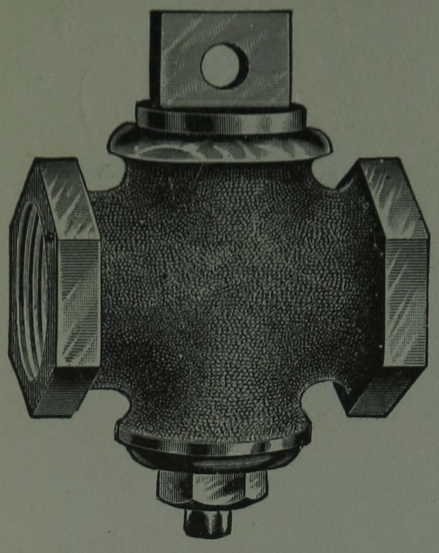
SLIP JOINT STUFFING BOXES.

IRON.

LIST.

Size, Inches.	Price.
1 to work in 1½	$ 4 60
1¼ to work in 1½	5 00
1½ to work in 2	5 80
2 to work in 2½	6 20
2½ to work in 3	7 00
3 to work in 4	8 60
4 to work in 5	13 60
5 to work in 6	15 00

Extra heavy Boxes made to order.

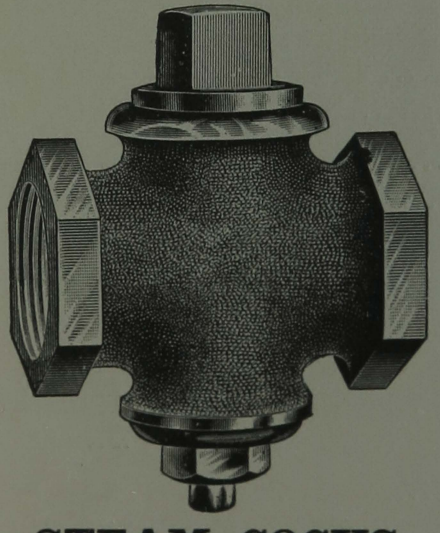


SERVICE COCKS.

FLAT HEAD.

LIST.

Size.....Inches,	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Square Head.....Each, } Flat Head.....Each, } Tee Handle.....Each,	$0 75	0 75	0 85	0 95	1 15	1 50	2 25	3 10	5 00	11 00	16 00
With Check .....Each,	90	90	1 00	1 10	1 35	1 70	2 50	....	....	.....	.....
Male and Female .....Each,	....	1 00	1 00	1 30	1 40	1 95	3 00	4 25	6 00	. . .	.....
Extra Heavy.....Each,	....	85	95	1 05	1 30	1 70	2 60	3 60	6 50	12 00	18 00



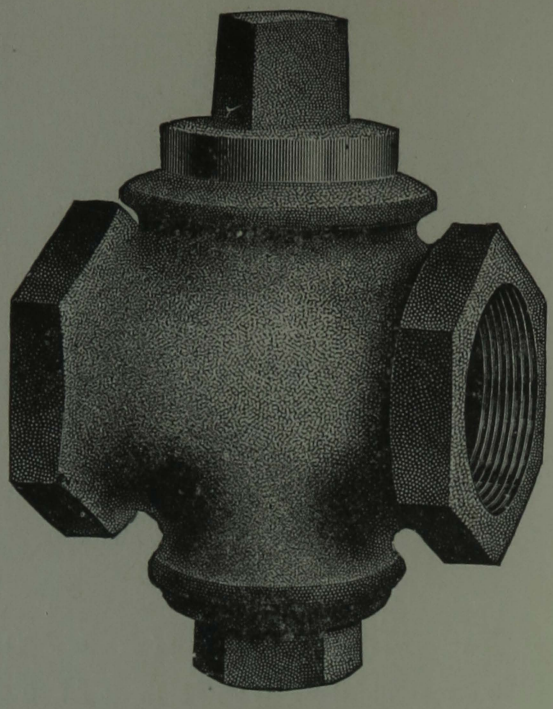
STEAM COCKS.

STEAM METAL.

LIST.

Size.....Inches,	⅛	¼	⅜	½	¾	1	1¼	1½
Square Head .....Each, } Flat Head.....Each, } Tee Handle.....Each,	$ 0 85	0 85	1 00	1 25	1 70	2 35	3 70	4 85
With Check.....Each,	1 00	1 00	1 15	1 40	1 90	2 55	3 95	5 15
Male and Female .....Each,	1 35	1 35	1 45	2 00	2 50	3 00	5 35	6 75
3-Way.....Each,	.....	.....	.....	2 50	3.00	3 75	5 75	7 15

Size.....Inches,	2	2½	3	3½	4	5	6	
Square Head.....Each, } Flat Head.....Each, } Tee Handle.....Each,	$ 7 30	14 50	22 50	38 50	50 00	.....	.....	.....
With Check.....Each,	7 65	15 00	23 25	.....	.....	.....	.....	.....
Male and Female.....Each,	9 85	17 50	25 75	.....	.....	.....	.....	.....
3-Way.....Each,	11 00	18 75	26 00	50 00	70 00	.....	.....	.....



ALL IRON COCKS.

LIST.

Size.....Inches,	⅜	½	¾	1	1¼	1½	2
Screwed.....Each,	$0 85	0 90	1 05	1 30	1 60	1 95	2 70
Size.....Inches,	2½	3	3½	4	5	6	.....
Screwed.....Each,	$4 40	6 75	12 00	15 50	32 00	45 00	.....

ALL IRON THREE-WAY COCKS.

LIST.

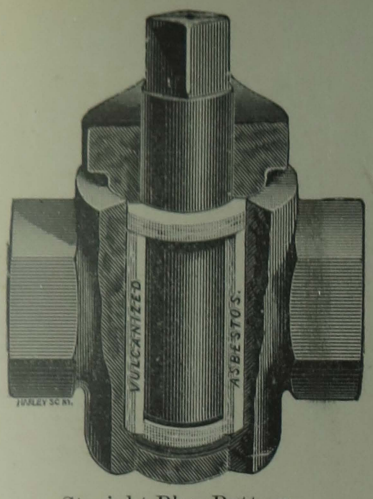
Size.....Inches,	⅜	½	¾	1	1¼	1½	2
Screwed.....Each,	.....	....	$1 65	1 80	2 05	2 65	3 65
Size.....Inches,	2½	3	3½	4	5	6	.....
Screwed.....Each,	$5 35	7 50	14 00	19 00	36 50	52 00	.....

IRON COCKS

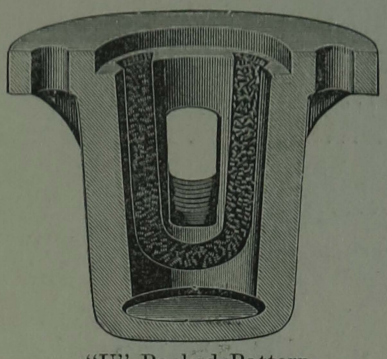
WITH BRASS FITTINGS.

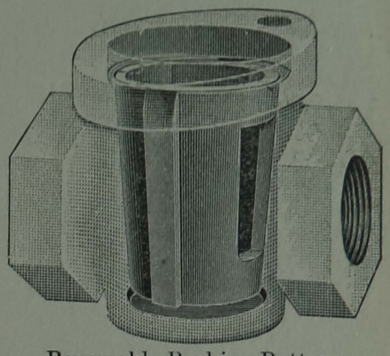
LIST.

Size.....Inches,	⅜	½	¾	1	1¼	1½	2
Screwed, with Brass Washer.....Each,	.....	$1 00	1 20	1 55	1 95	2 35	3 20
Screwed, with Brass Plug.....Each,	1 25	1 30	1 60	1 90	2 65	3 75	5 25
Screwed, with Brass Plug and Washer...Each,	.....	1 40	1 75	2 15	3 00	4 15	5 75
Size.....Inches,	2½	3	3½	4	5	6	.....
Screwed, with Brass Washer.....Each,	$5 15	7 75	14 00	19 00	38 00	53 00	.....
Screwed, with Brass Plug.....Each,	8 75	13 00	27 50	36 50	67 00	94 00	.....
Screwed, with Brass Plug and Washer...Each,	9 50	14 00	29 50	40 00	73 00	102 00	.....



Straight Plug Pattern.


"U" Packed Pattern.


Renewable Bushing Pattern.

VULCANIZED ASBESTOS PACKED BRASS AND IRON COCKS.

LIST.

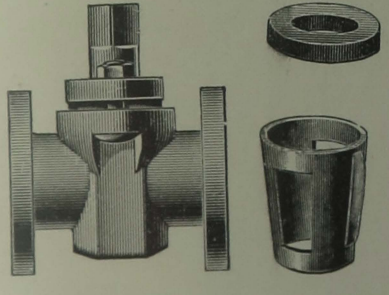
Size .....Inches,	⅛	¼	⅜	½	¾	1	1¼	1½
Price.....Each,	$1 30	1 30	1 45	1 60	2 10	2 50	3 50	4 75
Size.....Inches,	2	2½	3	3½	4	5	6	....
Price.....Each,	$7 00	12 00	18 00	27 00	30 00	45 00	60 00	....

When ordering, state what pressure cocks will be required to stand. The specially prepared Asbestos Packing in these cocks, when worn, may be renewed.

FOR HEAVY PRESSURES.

LIST.

Size .....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Heavy.....Each,	$1 50	1 75	2 00	2 50	3 00	4 25	5 75	8 50	14 50	21 50	32 50	36 00
Extra Heavy.....Each,	....	....	2 10	2 50	3 50	4 75	7 00	12 00	18 00	27 00	30 00	45 00



VULCANIZED ASBESTOS PACKED BRASS COCKS.

LIST.

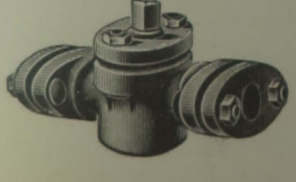
Size.....Inches,	¼	⅜	½	¾	1
Price.....Each,	$2 00	2 00	2 25	2 50	3 15
Size.....Inches,	1¼	1½	2	2½	3
Price.....Each,	$4 20	6 00	7 75	12 00	20 00

EXTRA ASBESTOS BUSHINGS AND TOP RINGS.

LIST.

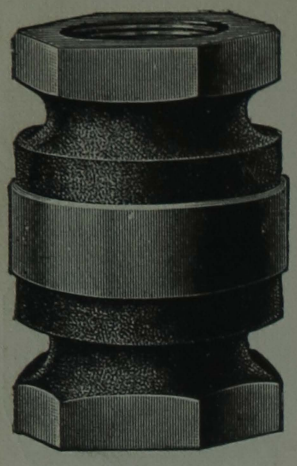
Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Top Ring.....Each,	$0 08	0 10	0 12	0 16	0 20	0 26	0 30	0 40	0 50	1 00	1 30	1 50
Bushing.....Each,	....	....	50	75	1 00	1 40	1 90	2 40	2 90	3 50	4 75	6 00

VULCANIZED ASBESTOS PACKED IRON AMMONIA COCKS.



LIST.

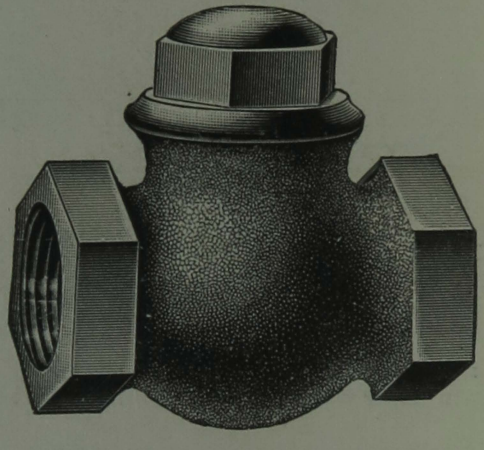
Size.....Inches,	¼	⅜	½	¾	1	1¼
Regular.....Each,	$1 30	1 45	1 60	2 10	2 50	3 50
Heavy.....Each,	1 45	1 60	2 10	2 50	3 50	4 75
Size.....Inches,	1½	2	2½	3	3½	4
Regular.....Each,	$4 75	7 00	12 00	18 00	27 00	30 00
Heavy.....Each,	7 00	12 00	18 00	27 00	....	.....



VERTICAL CHECK VALVES.

LIST

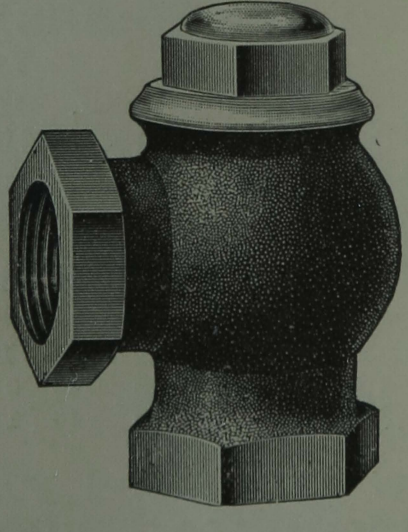
Size.....Inches,	1/8	1/4	3/8	1/2	3/4	1	1 1/4
Screwed.....Each,	.....	$0 72	0 77	1 00	1 26	1 80	2 52
Size.....Inches,	1 1/2	2	2 1/2	3	3 1/2	4	.....
Screwed.....Each,	$3 50	5 30	10 00	14 40	26 50	36 00	.....



HORIZONTAL CHECK VALVES.

LIST.

Size.....Inches,	1/8	1/4	3/8	1/2	3/4	1	1 1/4
Screwed.....Each,	$0 65	0 65	0 70	0 90	1 15	1 60	2 25
Size.....Inches,	1 1/2	2	2 1/2	3	3 1/2	4	.....
Screwed.....Each,	$3 15	4 75	9 00	13 00	24 00	32 50	.....



ANGLE CHECK VALVES.

LIST.

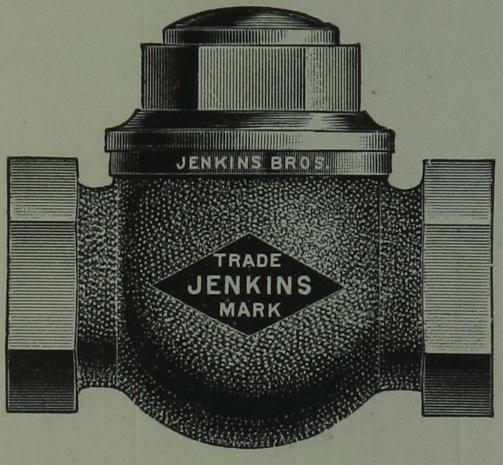
Size.....Inches,	1/8	1/4	3/8	1/2	3/4	1	1 1/4
Screwed.....Each,	$0 72	0 72	0 77	1 00	1 26	1 80	2 52
Size.....Inches,	1 1/2	2	2 1/2	3	3 1/2	4	.....
Screwed.....Each,	$3 50	5 30	10 00	14 40	26 50	36 00	.....

IRON BODY HORIZONTAL CHECK VALVES.

LIST.

Size.....Inches,	¾	1	1¼	1½	2	2½	3	3½	4
Screwed.....Each,	.....	$ 1 50	2 20	2 65	3 60	6 50	8 90	12 25	14 25
Flanged.....Each,	.....	2 50	3 25	4 00	5 25	8 25	11 50	15 50	18 00

Size.....Inches,	4½	5	6	7	8	10	12	14	16
Screwed.....Each,	$19 00	22 00	30 00	45 00	57 00	105 00	155 00	.....	.....
Flanged.....Each,	22 50	26 00	35 00	50 00	62 00	115 00	175 00	300 00	425 00

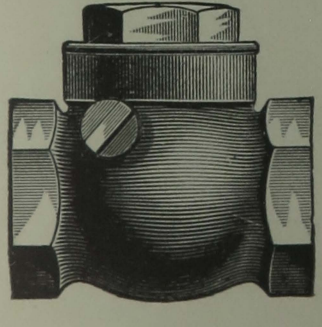


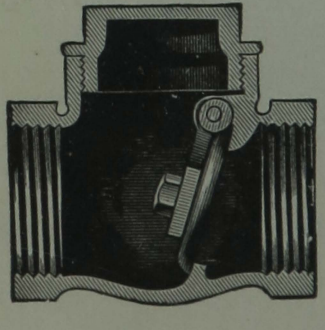
JENKINS BRASS CHECK VALVES.

HORIZONTAL, ANGLE AND VERTICAL.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Screwed.....Each,	$ 1 10	1 20	1 30	1 90	2 60	3 60	5 00	7 50	13 50	20 50
Flanged.....Each,	....	....	....	4 75	5 50	7 80	9 80	15 00	22 80	32 40



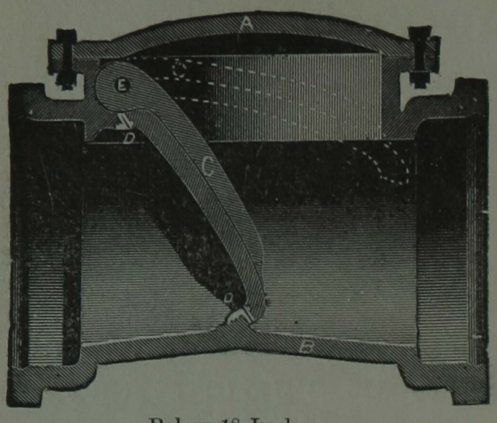


LUDLOW CHECK VALVES.

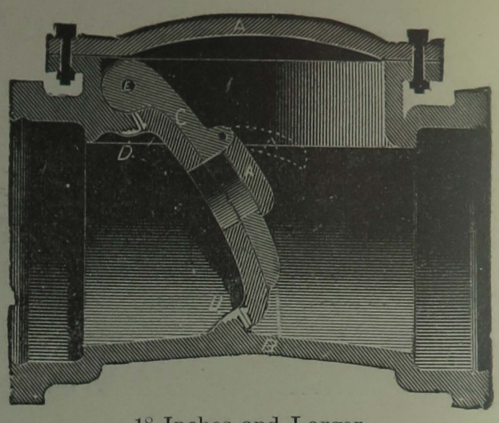
BRASS.

LIST.

Size.....Inches,	¾	1	1¼	1½	2	2½
Screwed.....Each,	$1 75	2 15	3 00	3 65	5 25	8 50



Below 18 Inches.

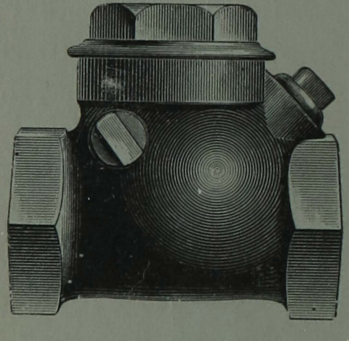


18 Inches and Larger.

LUDLOW IRON BODY CHECK VALVES.

LIST.

Size. Inches.	MEASUREMENTS. Diameter of Standard Flange. Inches.	Face to Face of Flanges. Inches.	Face to Face of Screw Socket. Inches.	End to End of Hubs. Inches.	Depth of Hubs. Inches.	BRASS MOUNTED. Screw Socket.	Flange.	Hub.
2½	7	8⅝	7⅝	9½	2¼	$ 7 75	.....	.....
3	8	9⅛	9	11¾	2¾	9 75	$11 00	$10 25
3½	8½	9¾	9⅜	11¾	2⅞	14 50	15 50	14 25
4	9	11¾	9⅞	13⅜	2⅞	20 50	21 50	20 50
5	10	13⅛	13	15	3	25 50	27 00	25 00
6	11	14½	13⅜	16	3	31 00	32 50	28 50
8	13	17¾	16¼	19	3¼	44 50	46 00	43 00
10	16	21½	....	24	3¼	77 50	76 50	73 00
12	18	24½	....	26½	3¼	97 00	95 00	92 00



PRATT & CADY SWINGING BRASS CHECK VALVES.

WITH SCREWED ENDS.

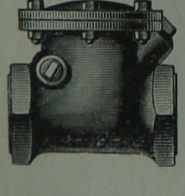
LIST.

Size.....Inches,	¼	⅜	½	¾	1
Price.....Each,	$1 25	1 25	1 30	1 75	2 25
Size .....Inches,	1¼	1½	2	2½	3
Price.....Each,	$3 25	4 25	6 25	11 50	16 00

Brass Check Valves are also furnished with flanged ends and for extra heavy pressures. Prices on application.

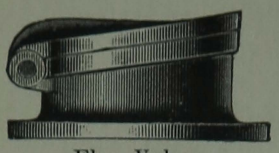
PRATT & CADY IRON BODY SWINGING CHECK VALVES.

WITH SCREWED, FLANGED OR BELL ENDS.



LIST.

Size.....Inches,	2	2½	3	3½	4	5	6
Price.....Each,	$6 25	10 00	12 00	16 00	18 00	25 00	32 00
Size.....Inches,	7	8	10	12	14	16	.....
Price.....Each,	$41 00	50 00	65 00	95 00	200 00	250 00	.....

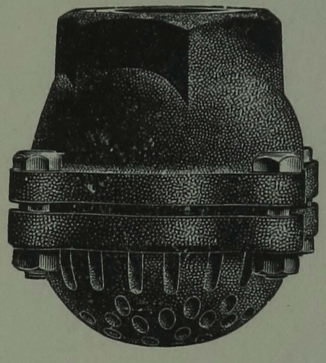


Flap Valve.

VALVES AND EJECTORS.

LIST.

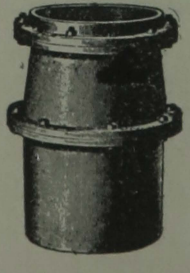
Number of Pump	1½	2	2½	3	4	5	6	8	10
Foot Valve and Strainer	$5 00	7 00	8 00	9 00	14 00	17 00	25 00	30 00	40 00
Flap Valves	....	....	.....	9 00	13 00	19 00	22 00	25 00	32 00
Gate Valves	5 00	9 00	12 50	15 50	21 00	27 00	32 00	40 00	50 00
Ejector	8 00	8 00	8 00	12 00	15 00	25 00	25 00	30 00	30 00



IRON BODY FOOT VALVES.

LIST.

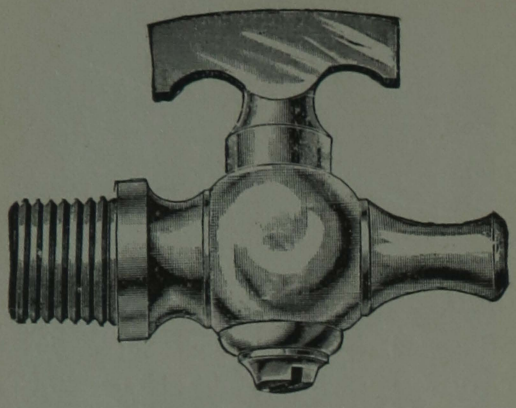
Size.....Inches,	¾	1	1¼	1½	2	2½	3	3½	4
Screwed.....Each,	$1 15	1 30	1 40	1 90	2 40	3 30	3 90	5 60	7 30
Flanged.....Each,	.....	....	....	....	3 50	4 50	5 75	7 50	9 50
Size.....Inches,	4½	5	6	7	8	10	12	14	16
Screwed.....Each,	$10 50	11 25	14 75	35 00	41 00	61 00	100 00	....	....
Flanged.....Each,	13 00	14 00	17 50	38 00	45 00	70 00	112 00	150 00	200 00



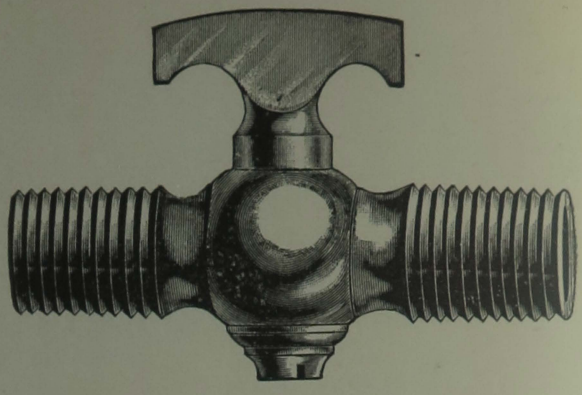
SAND PUMP FOOT VALVES.

LIST.

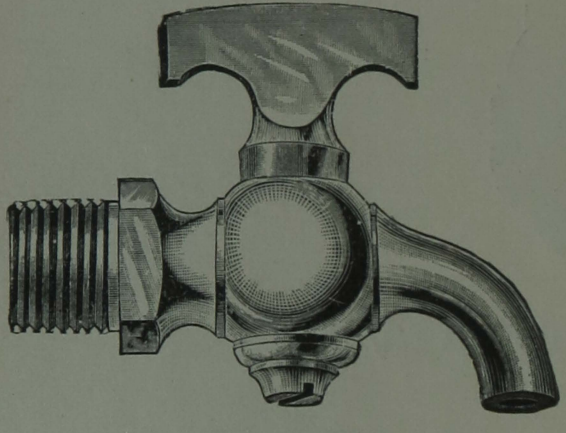
Size.....Inches,	3	4	5	6	8	10	12	14
Sand Pump Foot Valve	$10 00	15 00	15 00	18 00	25 00	35 00	45 00	55 00
Ejectors	8 00	10 00	10 00	15 00	20 00	25 00	35 00	45 00



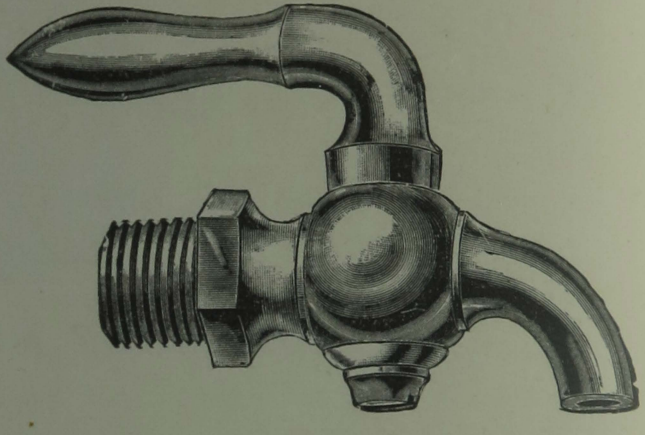
T. H. and Shoulder.



Double End, T. H.



Bibb Nose, T. H.



Bibb Nose, L. H.

AIR COCKS.

LIST.

Size.....Inches	1/8	1/4	3/8	1/2	3/4
Tee Handle, Single Thread.....Each	$0 40	$ 40	$ 50	$ 60	.....
Lever Handle, Single Thread.....Each	55	55	65	75	.....
Tee Handle, Double Thread, Male.....Each	55	55	65	90	.....
Lever Handle, Double Thread, Male.....Each	60	70	85	1 00	.....
Bibb, Tee Handle.....Each	70	70	80	90	.....
Bibb, Lever Handle.....Each	80	80	90	1 00	.....
Bibb, Tee Handle, Double Thread.....Each	80	1 00	1 10	1 35	.....
Bibb, Lever Handle, Double Thread.....Each	95	1 15	1 25	1 50	.....

CYLINDER COCKS.

LIST.

Size.....Inches,	¼	⅜	½	¾
Bibb, Lever Handle, Single Thread.....Each,	$1 15	1 30	1 85	2 60
Bibb, Lever Handle, Double Thread.....Each,	1 25	1 50	2 10	2 70
With Union Lever Handle, Bibb.....Each,	1 75	2 00	2 50	3 75
With Union Lever Handle, Straight.....Each,	1 75	2 00	2 50	3 75

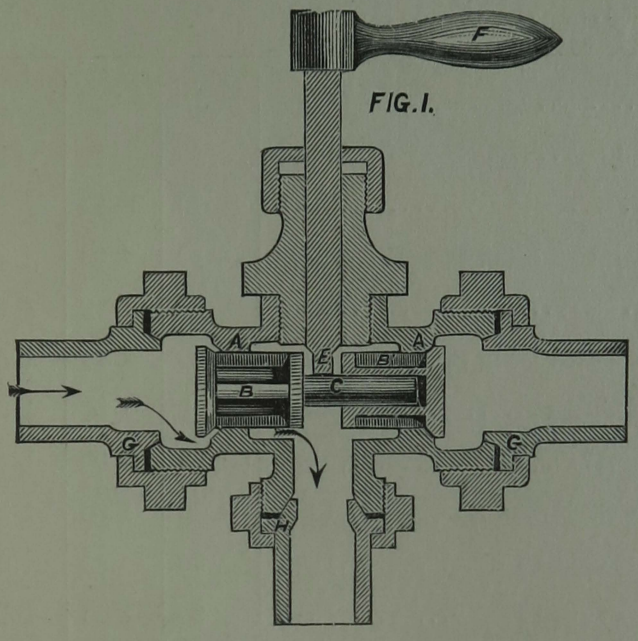


FIG. I.

AUTOMATIC CYLINDER COCKS.

LUNKENHEIMER'S.

FOR SLIDE VALVE ENGINES AND PUMPS.

Automatically remove the condensation from cylinders of SLIDE VALVE engines and pumps without loss of steam. When steam is admitted to one end of the cylinder, the valve B for that end closes under pressure, and forces open by means of stem C the valve for the other end (holding it open for the whole stroke of piston), and allowing the water of condensation to flow out into the drain pipe. This action is reversed when steam enters the other end of cylinder, and so on, alternately, always leaving the exhaust end of the cylinder open for the escape of water.

If desired, both valves can be held open by turning Lever F.

LIST.

Size.....Inches	⅛	¼	⅜	½	¾	1	1¼	1½
Adapted to Cylinder...	Up to 6 in. Diameter.	From 6 to 10 inches.	From 10 to 14 inches.	From 14 to 20 inches.	From 20 to 30 inches.	From 30 in. Upward		
Price.....Each	$ 4 00	7 20	9 00	12 00	18 00	28 00	40 00	56 00

Directions furnished with each Cock.

STEAM GAUGE COCKS.

LIST.

Size.....Inches,	¼
With Union Tee Handle.....Each,	$1 75
Male and Female, Tee Handle.....Each,	75
Female, Tee Handle.....Each,	75

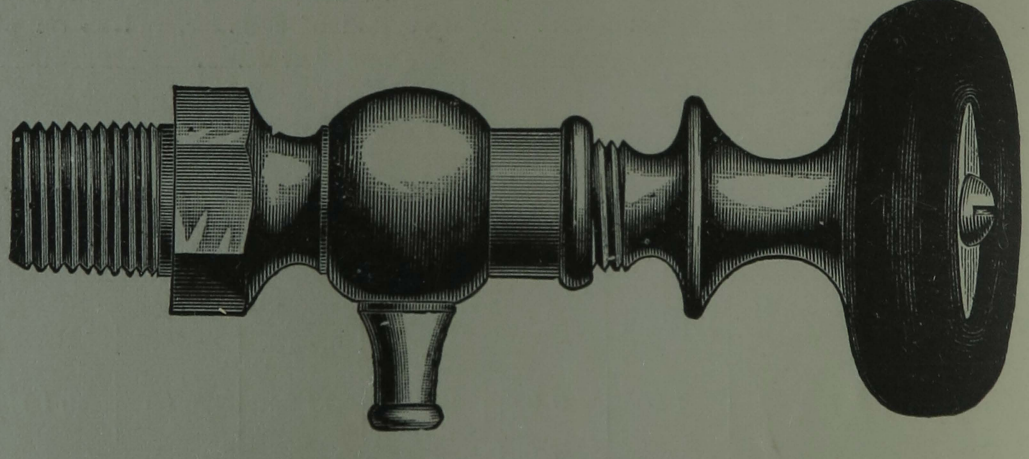
CYLINDER AND STEAM GAUGE COCKS.

LUNKENHEIMER'S.

LIST.

Numbers	1	2	3	4	5	6
Size of Blank Shank.....Inches	⅜	½	⅝	¾	⅞	1
Size of Shank Pipe Thread.....Inches	⅛	¼	⅜	½	½	¾
T. H. Cylinder Cock.....Each	$ 75	$ 85	$ 95	$1 25	$1 75	$2 25
T. H. Cylinder Cock, with Extra Long Shank ...Each	80	1 00	1 25	1 35	2 00	2 50
L. H. Cylinder Cock.....Each	90	1 00	1 10	1 50	2 00	2 50
L. H. Cylinder Cock, with Extra Long Shank....Each	1 00	1 15	1 35	1 65	2 25	2 75
L. H. Cylinder Cock, with Union.....Each	1 40	1 50	1 60	1 75	2 25	3 00
Traction Cylinder Cock.....Each	1 15	1 30	1 40	1 85	....	....
Traction Cylinder Cock, with Union.....Each	1 70	1 80	1 95	2 20	....	....
T. H. Steam Gauge Cock, Female End.....Each	75	85	95	....	....	....
L. H. Steam Gauge Cock, Female End.....Each	90	1 00	1 10	....	....	....
T. H. Steam Gauge Cock, Male and Female Ends.Each	75	85	95	....	....	....
L. H. Steam Gauge Cock, Male and Female Ends Each	90	1 00	1 10	....	....	....
L. H. Steam Gauge Cock, with Union.....Each	1 40	1 50	1 60	....	....	...

Unless otherwise ordered, L. H. Cylinder Cocks will be sent with Angle, and T. H. with Straight Outlets.

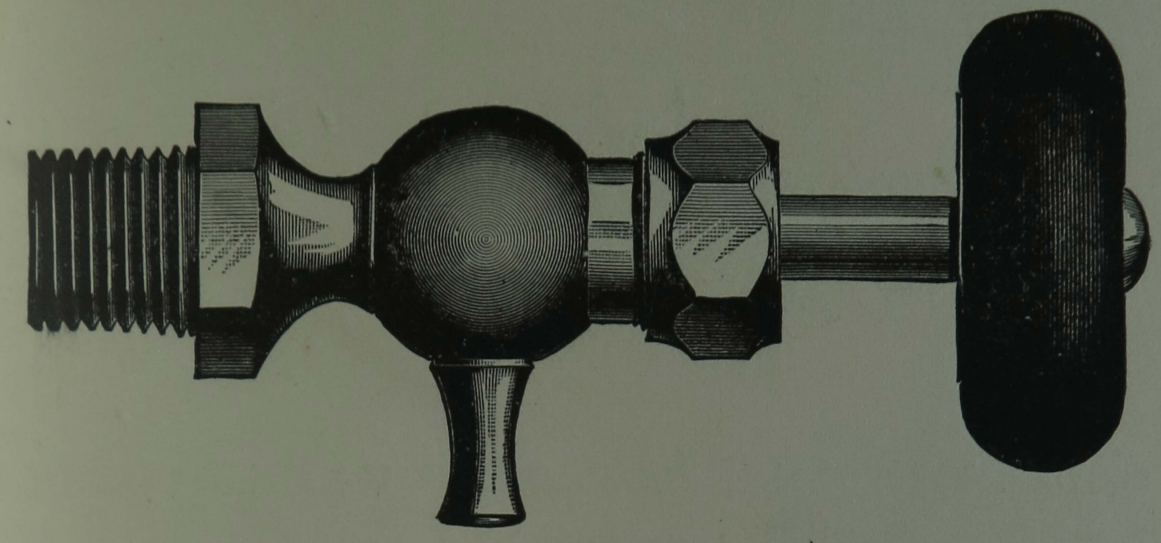


GAUGE COCKS.

LIST.

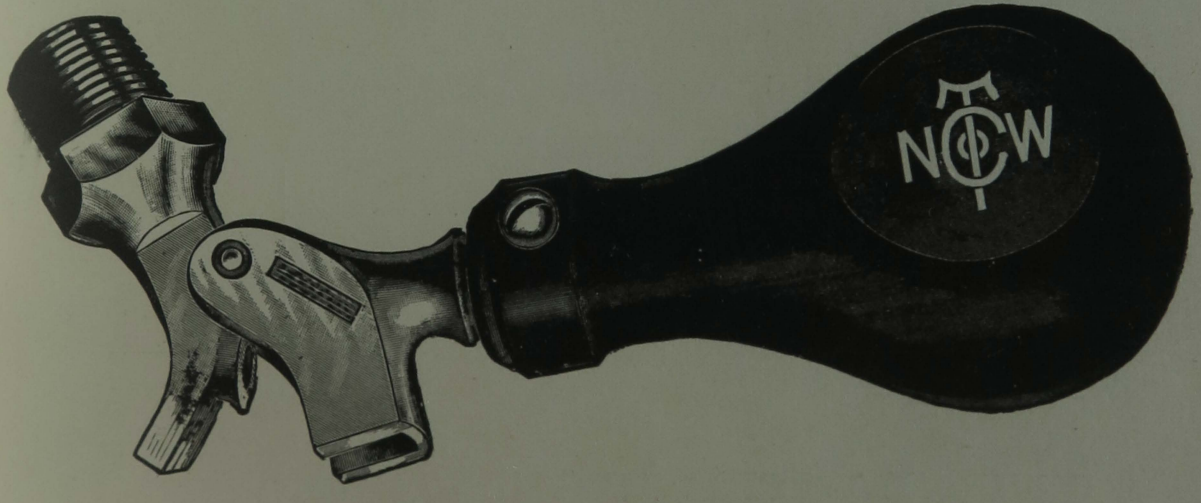
Size.....Inches,	⅜	½	¾	¾
Wood Wheel Compression, no Stuffing Box, Standard.....Each,	$1 10	1 20	1 35	1 35
Wood Wheel Compression, no Stuffing Box, Light Pattern.....Each,	95	1 00	1 25	1 25

GAUGE COCKS—Continued.



LIST.

Size..... Inches,	⅜	½	¾
Wood Wheel Compression, with Stuffing Box, Standard.....Each,	$1 35	1 50	1 70
Wood Wheel Compression, with Stuffing Box, Light Pattern.....Each,	1 20	1 30	1 45



LIST.

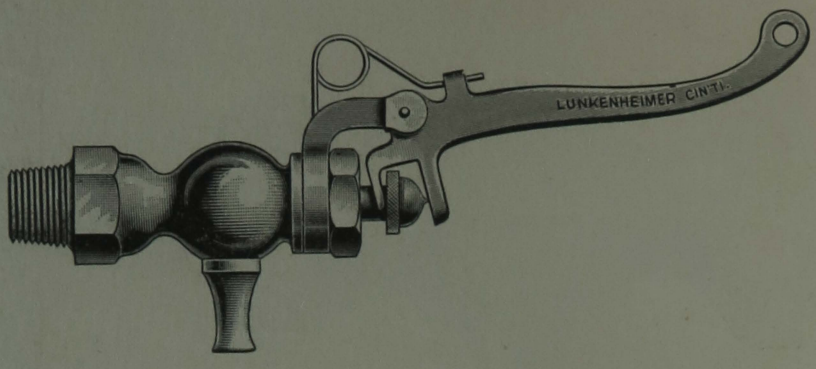
Size.....Inches,	½	¾
Ball Gauge Cocks.....Each,	$1 00	1 00

MISSISSIPPI GAUGE COCKS.

LIST.

Size Chased Iron Pipe.....Inches,	⅜	½		¾
Size Blank Shank.....Inches,	⅝	¾	⅞	1
Price.....Each,	$0 90	1 20	1 50	1 80

GAUGE COCKS—Continued.



SELF-GRINDING, ROTATING GAUGE COCKS.

LUNKENHEIMER'S.

In many places it is often necessary to place the Gauge Cocks where they are not accessible by hand. In such cases Self-Grinding, Rotating Gauge Cock will be found satisfactory in every way. When placed out of reach, a piece of chain or rope can be attached so that it may be operated. The self-grinding feature is quite an advantage as the cock will stay tight much longer than the ordinary pattern. Another valuable feature of this Gauge Cock is that the lever is adjustable and it can be kept in a vertical position no matter at what angle the outlet tip may be turned.

LIST.

Size—Blank Shank	Inches	¾	1
Cut for Pipe Thread	Inches	½	¾
Finished Brass	Each	$2 50	$2 50

DAMPER REGULATORS.

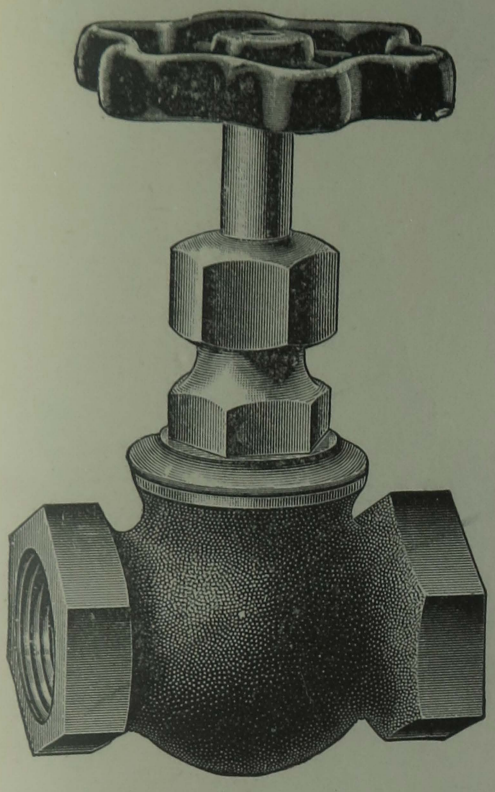
CLARK'S.

LIST.

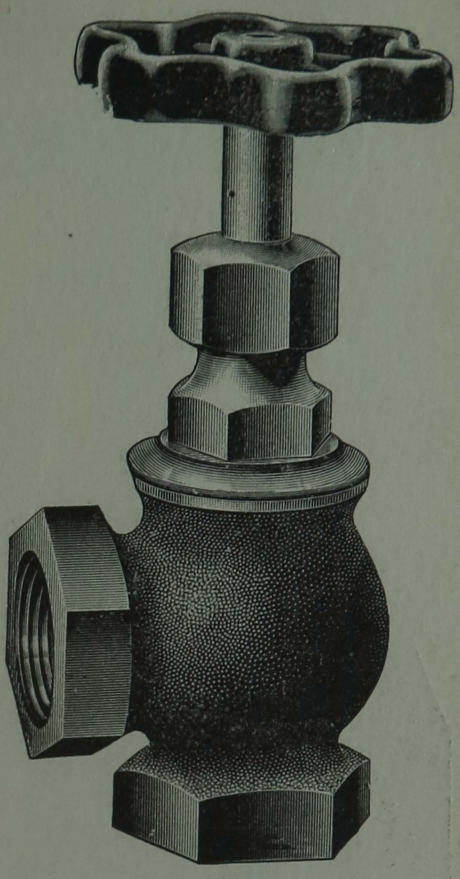
No. 1,	for Boilers of 5 horse-power and under	Each,	$10 00
No. 2,	for Boilers of 20 horse-power and under	Each,	15 00
No. 3,	for Boilers of 30 to 500 horse-power	Each,	25 00

LOW PRESSURE DAMPER REGULATORS.

Price	Each,	$10 00



Globe.



Angle.

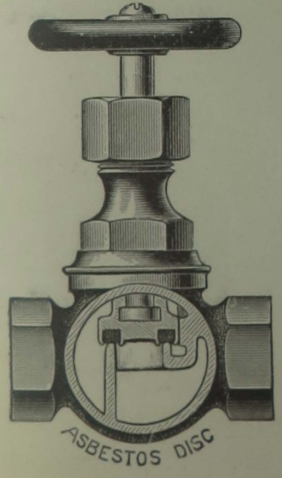
GLOBE AND ANGLE VALVES.

BRASS.

LIST.

Size.....Inches,	⅛	¼	⅜	½	¾	1	1¼	1½
Standard, Screwed.....Each,	$0 72	0 72	0 77	1 00	1 26	1 80	2 52	3 50
Standard, Flanged.....Each,	....	....	....	4 50	5 00	6 75	8 50	10 50

Size.....Inches,	2	2½	3	3½	4	5	6	....
Standard, Screwed.....Each,	$5 30	10 00	14 40	26 50	36 00	.....	.....	....
Standard, Flanged.....Each,	16 00	23 00	35 00	50 00	70 00	125 00	200 00	....

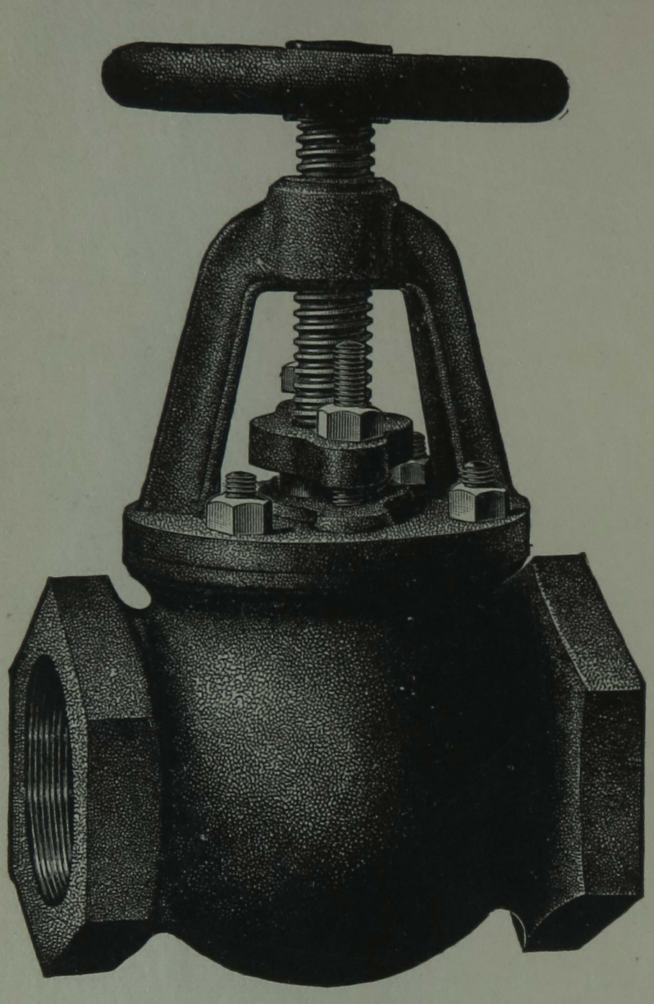


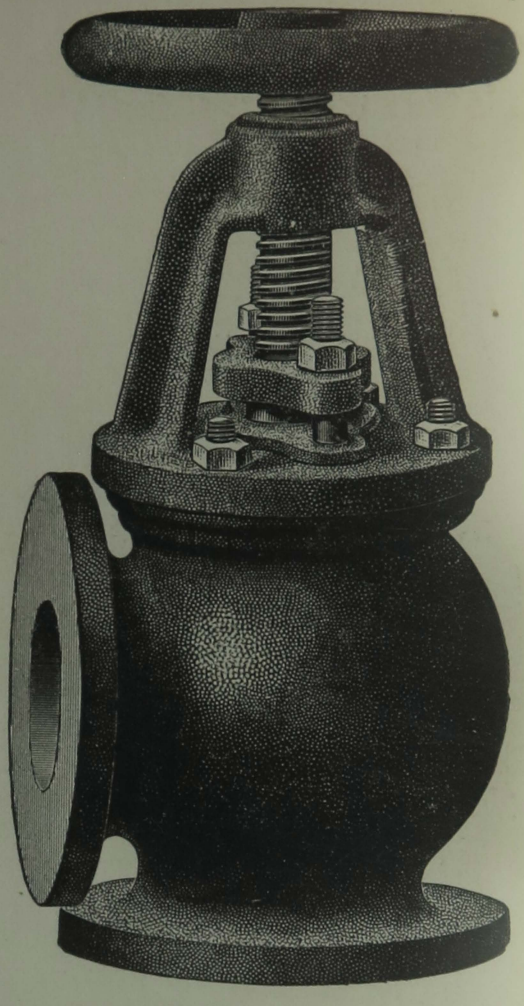
VULCANIZED ASBESTOS DISC.

LIST.

Size ... Inches,	⅛	¼	⅜	½	¾	1
Price .... Each,	$1 10	1 10	1 25	1 60	2 20	2 80
Size ... Inches,	1¼	1½	2	2½	3	....
Price .... Each,	$4 00	5 50	8 00	15 75	22 00	....

GLOBE AND ANGLE VALVES—Continued.



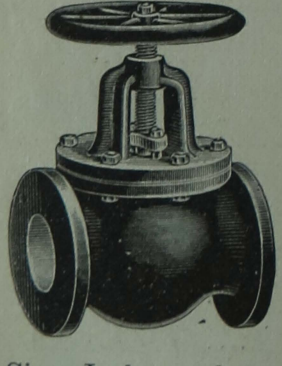


IRON BODY, BRASS MOUNTED, WITH YOKE.

LIST.

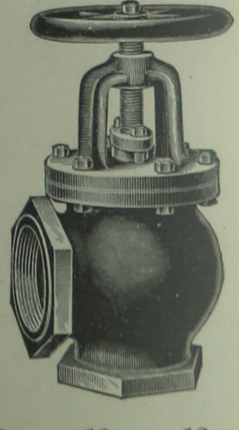
Size..... Inches,	2	2½	3	3½	4	4½	5
Standard, Screwed.....Each,	$ 7 00	9 00	12 50	15 25	19 00	24 00	27 00
Standard, Flanged.....Each,	8 60	10 75	15 00	18 50	22 50	27 50	31 00

Size.....Inches,	6	7	8	10	12	14	16
Standard, Screwed.....Each,	$37 50	63 00	72 00	114 00	170 00	.....	.....
Standard, Flanged.....Each,	42 00	68 00	77 00	123 00	187 00	350 00	475 00



VULCANIZED ASBESTOS DISC, IRON BODY, GLOBE AND ANGLE VALVES

WITH YOKE AND SCREWED OR FLANGED ENDS.



LIST.

SCREWED END.

Size..... In.	2	2½	3	3½	4	4½
Price..Each,	$10 00	12 00	16 75	19 50	24 00	32 00

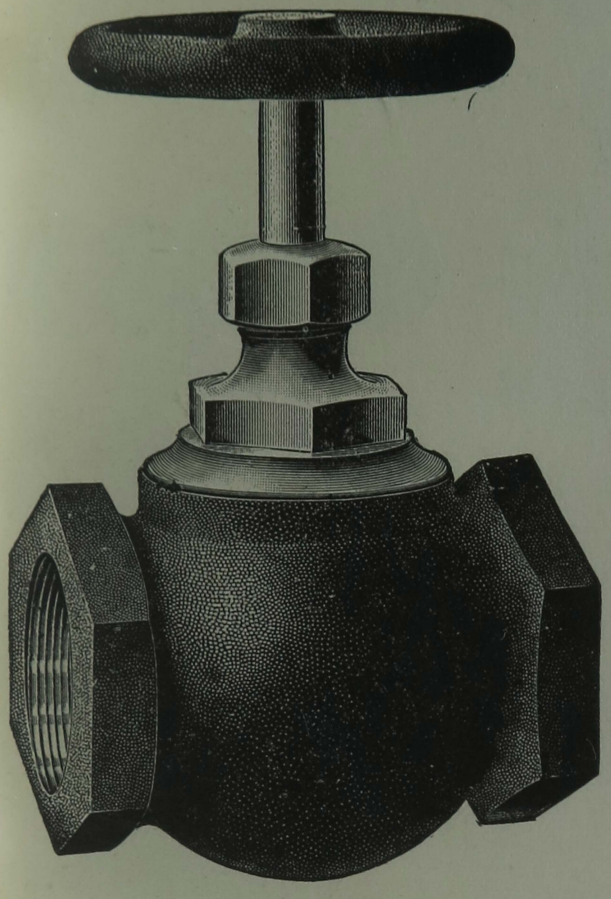
Size.....In.	5	6	7	8	10	12
Price..Each,	$40 00	48 00	80 00	90 00	130 00	185 00

LIST.

FLANGED END.

Size..Inches,	2	2½	3	3½	4	4½	5	6	7	8	10	12
Price...Each,	$11 75	14 00	18 50	21 50	26 00	34 00	42 00	50 00	80 00	90 00	130 00	185 00

GLOBE AND ANGLE VALVES—Continued.



IRON BODY, BRASS MOUNTED.

LIST.

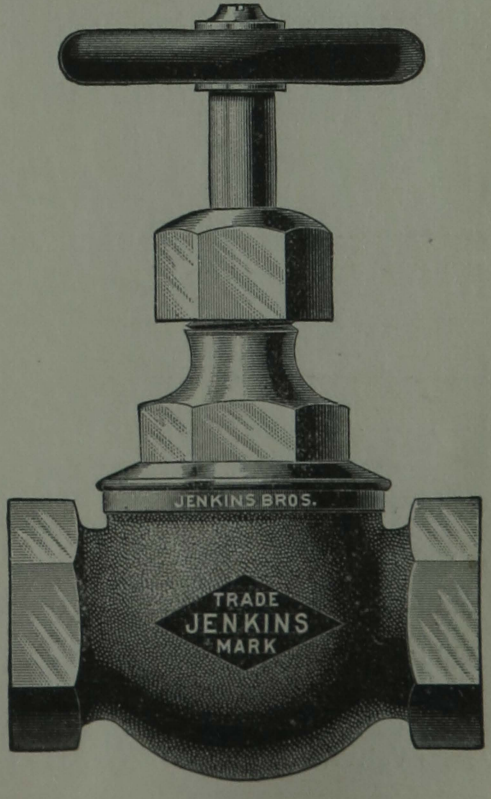
Size.....Inches,	1	1¼	1½	2	2½	3
Standard, Screwed: Each,	$2 25	2 75	3 50	5 40	7 35	9 80
Standard, Flanged: Each,	3 25	3 85	4 80	7 00	9 00	12 50

JENKINS GLOBE AND ANGLE VALVES.

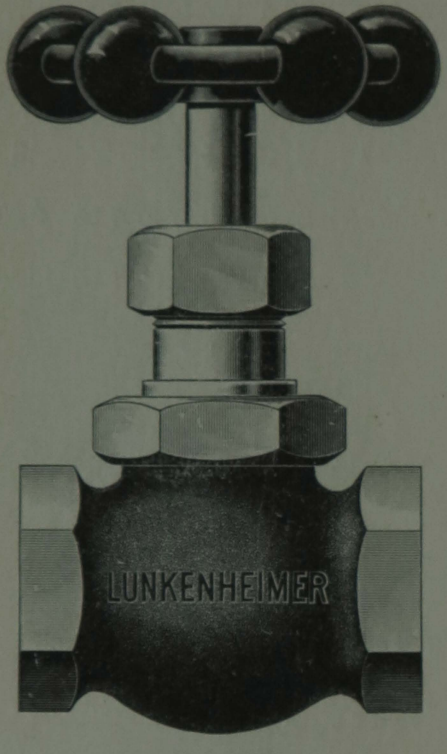
LIST.

Size....Inches,	⅛	¼	⅜	½	¾	1
Screwed..Each,	$1 10	1 10	1 25	1 60	2 20	2 80
Flanged..Each,	....	....	....	....	....	6 00

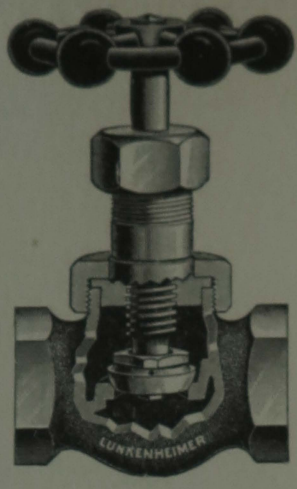
Size.....Inches,	1¼	1½	2	2½	3
Screwed..Each,	$4 00	5 50	8 00	15 75	22 00
Flanged..Each,	9 00	11 00	16 50	25 00	34 00



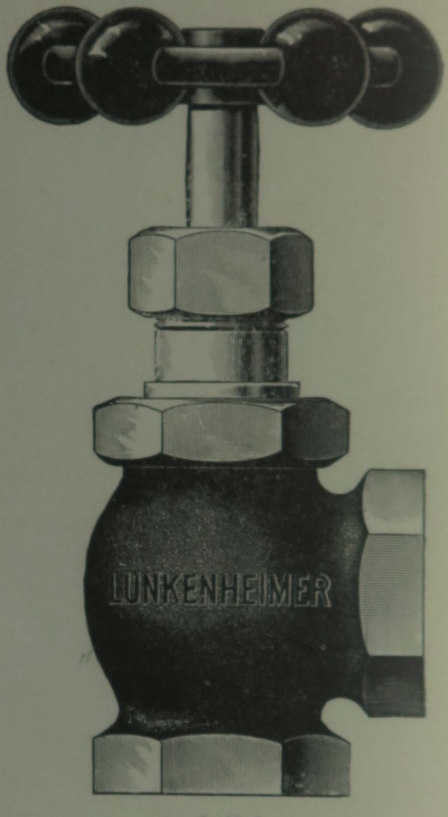
These valves contain the Jenkins Discs, which will *not corrode nor stick to the seat;* consequently, the valves are always ready to operate, even if they have been idle for years. They are the most reliable valves in the market; and a trial will convince the most skeptical. The discs used in these valves will stand two hundred pounds steam pressure, and will last for years.



Globe Valve.



Sectional.



Angle Valve.

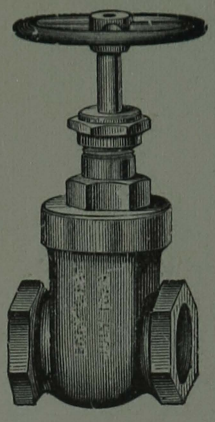
PATENT REGRINDING GLOBE AND ANGLE VALVES.

LUNKENHEIMER'S.

LIST.

Size.....Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Globe Valves.....Each	$ 70	$ 70	$ 85	$1 15	$1 45	$2 00	$2 80	$3 90	$ 6 20	$12 00	$16 50
Angle Valves.....Each	70	70	85	1 15	1 45	2 00	2 80	3 90	6 20	12 00	16 50
Add to list for Glands.....Each	.....	.....	.....	....	07	07	10	10	14	.....	.....
Add to list for rough Brass Wheel. Each	14	14	16	20	26	36	43	50	73	1 65	2 20
Fin. all over, with Brass Wheel... Each	1 75	1 90	2 15	2 50	3 10	3 65	5 25	7 25	10 75	22 00	33 50
Cross Valves.....Each	.....	1 00	1 00	1 50	2 00	2 70	3 50	5 10	8 00	16 00	24 00

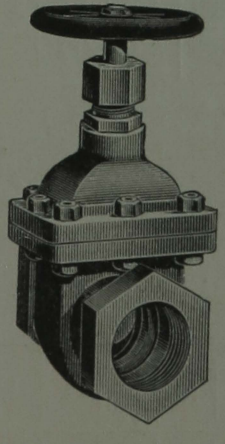
GATE VALVES.



BRASS DOUBLE GATE.

LIST.

Size.....Inches,	⅜	½	¾	1	1¼	1½	2	2½	3
Screwed Ends.....Each,	$1 00	1 20	1 75	2 50	3 50	5 00	7 50	14 00	19 50
Flanged Ends.....Each,	2 50	2 75	3 50	4 50	5 50	7 50	12 00	18 00	25 00



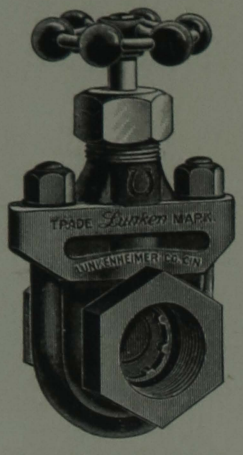
IRON BODY DOUBLE GATE.

BRASS MOUNTED.

LIST.

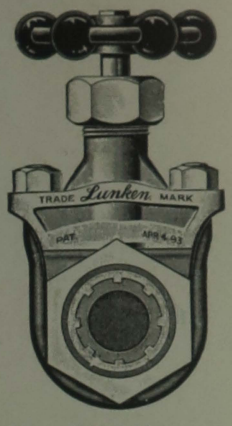
Size.....Inches,	2	2½	3	3½	4	4½	5	6	7	8	10	12
Screw Ends.....Each,	$10 00	12 00	15 00	18 00	20 00	23 00	25 00	30 00	43 00	53 00	70 00	95 00
Flange Ends....Each,	9 00	12 00	15 00	18 00	20 00	23 00	25 00	30 00	40 00	50 00	65 00	90 00

GATE VALVES—Continued.



Iron Body, Screwed.
Made with Screwed Ends only.
¼ inch to 3 inches.
For 150 pounds Working Pressure.

LUNKEN.



Brass Body, Screwed.
Made with Screwed and Flanged Ends.
¼ inch to 6 inches.
For 200 pounds Working Pressure.

Seat and disc are renewable without disconnecting pipes.
Balanced disc; frictionless, and operating easily under high pressure.
Is more compact than a globe valve.
A rising spindle, indicating whether it is open or shut.

LIST—IRON.

Size.....Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Iron Body, Brass M't'd, Screw Ends...Each	$1 20	1 25	1 50	1 90	2 50	3 50	5 00	7 50	12 00	15 00
Extra Seats, Discs and Wrenches.....Each	08	10	12	16	22	30	40	50	75	1 00

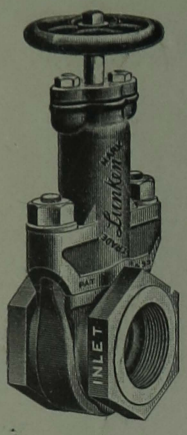
NOTE.—In ordering these valves always mention "Iron."

These valves have brass wearing parts, *i. e.*, stem, disc, seat, wedge and stuffing-box; are intended to take the place of ordinary globe and other style gate valves; are warranted to stand 150 pounds working pressure; and made only with screw ends.

LIST—BRASS.

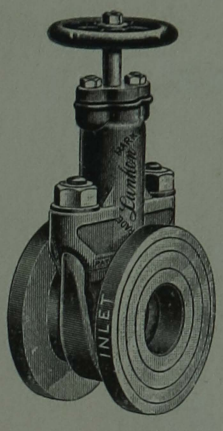
Size.....Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	4	5	6
Brass, Screw Ends.....Each	$1 20	1 25	1 50	1 90	2 50	3 50	5 00	7 50	14 00	20 00	80 00	110 00	150 00
Brass, Flange Ends.....Each	.....	....	3 00	3 80	5 50	7 00	9 50	15 00	24 00	32 00	90 00	130 00	175 00
Ex. Seats, Discs and W...Each	08	10	12	16	22	30	40	50	75	1 00	.....	.....	.....
Weight Complete.....Pounds	⅝	¾	1	1⅝	2¼	3⅛	4¼	6¾	11	17	55	85	115
Diameter of Flanges....Inches	.....	....	3	3½	4	4½	5	6	7	7½	9	10	11
Weight Complete.....Pounds	.....	....	2½	3⅜	5	6¾	9½	12½	21½	29	65	100	135

GATE VALVES—Continued.



Iron Body, Screwed.
2-inch to 12-inch.
Heavy.
For 200 lbs. Working Pressure.

LUNKEN.



Iron Body, Flanged.
2-inch to 12-inch.
Heavy.
For 200 lbs. Working Pressure.

IRON BODY, BRASS MOUNTED.

HEAVY.

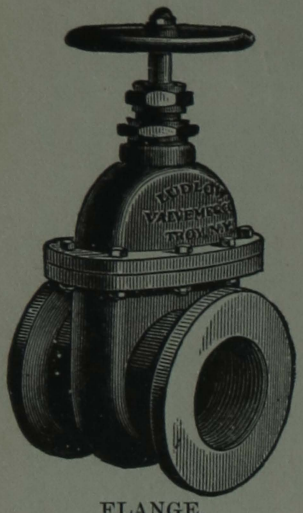
LIST.

Size.....Inches	2	2½	3	3½	4	4½	5
Iron, Brass Mounted, Screw Ends.....Each	$ 9 00	$12 00	$15 00	$18 00	$22 00	$26 00	$32 00
Iron, Brass Mounted, Flange Ends.....Each	10 50	14 00	17 50	21 00	25 00	30 00	36 00
Extra Seats, Discs and Wrenches.....Each	50	75	1 00	1 25	1 50	2 00	2 50
Diameter of Flanges.....Inches	6	7	7½	8½	9	9¼	10
Weight Complete, Screw Ends.....Pounds	12	23	32	44	59	74	92
Weight Complete, Flange Ends.....Pounds	18	31	42	56	73	89	111

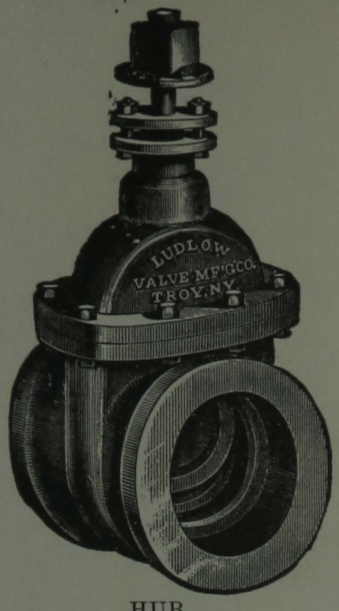
Size.....Inches	6	7	8	9	10	12
Iron, Brass Mounted, Screw Ends.....Each	$40 00	$56 00	$70 00	$82 00	$100 00	$140 00
Iron, Brass Mounted, Flange Ends.....Each	44 00	61 00	75 00	87 00	106 00	146 00
Extra Seats, Discs and Wrenches.....Each	3 00	3 50	4 20	5 00	6 00	8 00
Diameter of Flanges.....Inches	11	12½	13½	15	16	19
Weight Complete, Screw Ends.....Pounds	124	157	200	225	265	395
Weight Complete, Flange Ends.....Pounds	150	187	233	269	318	454

NOTICE.—When ordering these valves in 2 to 3-inch sizes mention "Heavy."
Iron Body Brass Mounted Valves have solid brass stems.
All orders will be filled with brass stem valves unless otherwise ordered.
All "Lunken" Valves furnished with standard English threads or flanges without extra cost.

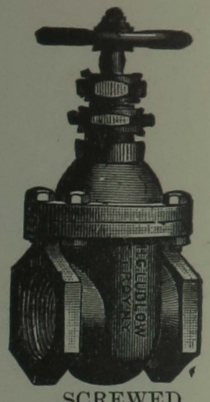
GATE VALVES—Continued.



FLANGE.



HUB.



SCREWED.

LUDLOW.

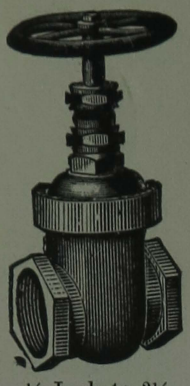
REGULAR—LIST.

MEASUREMENTS. BRASS MOUNTED OR ALL IRON.						BRASS MOUNTED.				ALL IRON.				
Size. Inches.	Diameter Stan'd Flange. Inches.	Face to Face of Flanges. Inches.	Face to Face of Screw Socket. Inches.	End to End of Hubs. Inches.	Depth of Hubs. Inches.	Screw Socket.	Flange.	Hub.	Spigot.	Screw Socket.	Flange.	Hub.	Spigot.	Extra for Slide, Stem and Lever.
1	....	....	3¾	....	....	$ 5 00	.....	.....	.....	$ 4 75	.....	.....	.....	....
1¼	....	....	3¾	....	....	5 50	.....	.....	.....	5 25	.....	.....	.....	....
1½	5½	5½	4	....	....	6 00	$ 6 25	.....	.....	5 75	$ 6 25	.....	.....	$1 00
2	6½	5⅝	4⅞	7	2¼	7 00	7 50	$ 7 00	$ 7 25	6 25	7 25	$ 7 00	$ 7 25	1 25
2½	7	6⅛	5⅜	7¾	2¼	10 25	10 75	10 00	10 25	8 75	9 25	8 50	8 75	1 75
3	8	6⅞	5½	8⅝	2½	12 25	13 25	14 50	15 00	10 00	11 25	10 25	10 75	2 00
3½	8½	8¼	7	9⅜	2⅝	16 50	17 50	16 00	16 50	14 00	15 25	13 75	14 25	2 00
4	9	8¼	7¼	9⅜	2¾	18 00	18 50	17 00	17 50	15 00	16 50	15 00	15 50	2 00
4½	9½	9¾	9½	..	..	23 00	23 50	22 00	22 50	20 50	21 50	20 50	21 00	2 25
5	10	10¾	11	12	3½	25 00	25 50	24 00	24 50	23 00	23 50	22 00	22 50	2 25
6	11	11⅛	11¼	12½	3⅞	30 50	31 00	28 00	28 75	27 00	28 00	26 00	26 75	2 25
7	12	11¼	12	13⅞	....	38 00	38 00	37 00	38 00	33 00	33 50	32 00	33 00	2 25

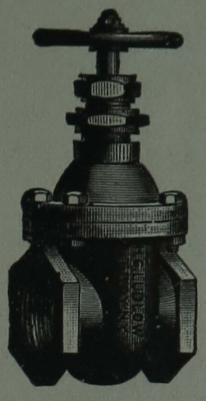
HEAVY PRESSURE—LIST.

MEASUREMENTS.						BRASS MOUNTED.				ALL IRON.				
Size. Inches.	Diameter Stan'd Flange. Inches.	Face to Face of Flanges. Inches.	Face to Face of Screw Socket. Inches.	End to End of Hubs. Inches.	Depth of Hubs. Inches.	Screw Socket.	Flange.	Hub.	Spigot.	Screw Socket.	Flange.	Hub.	Spigot.	Extra for Slide, Stem and Lever.
3	8	8	7¾	10	2⅝	$15 00	$16 00	$14 50	$15 00	$13 00	$14 25	$12 75	$13 00	$2 00
3½	8½	8¼	7	9⅜	2⅝	16 50	17 50	16 00	16 50	14 00	15 25	13 75	14 00	2 00
4	9	8⅝	7⅞	10½	3	19 00	20 00	18 00	18 50	16 50	17 50	16 50	17 00	2 00
4½	9½	9¾	9½	11	3¼	23 00	23 50	22 00	22 50	20 50	21 50	20 50	21 00	2 25
5	10	10¾	11	12	3½	25 00	25 50	24 00	24 50	23 00	23 50	22 00	22 50	2 25
6	11	11⅛	11¾	13¼	3⅝	32 50	33 00	31 50	32 25	28 00	29 00	27 50	28 25	2 25
7	12	11¼	12	13⅞	4	38 00	38 00	37 00	38 25	33 00	33 50	32 00	33 00	2 25
8	13	13¼	13½	14	4¼	48 00	47 00	45 00	47 50	40 00	40 50	38 00	39 00	2 25
9	15	13	13	15½	4¼	62 00	62 00	58 00	60 50	48 00	47 00	45 00	47 50	3 25
10	16	15	....	14⅞	4¼	70 00	70 00	63 00	65 50	61 00	60 00	55 00	57 00	3 25
12	18	15½	....	15¾	4¼	88 00	88 00	83 00	86 00	77 00	75 00	70 00	73 00	4 00

GATE VALVES—Continued.



½ Inch to 2½.



2½ Inches and Larger.

DOUBLE GATE BRASS VALVES.

LUDLOW.

GLAND IN PACKING BOX.

LIST.

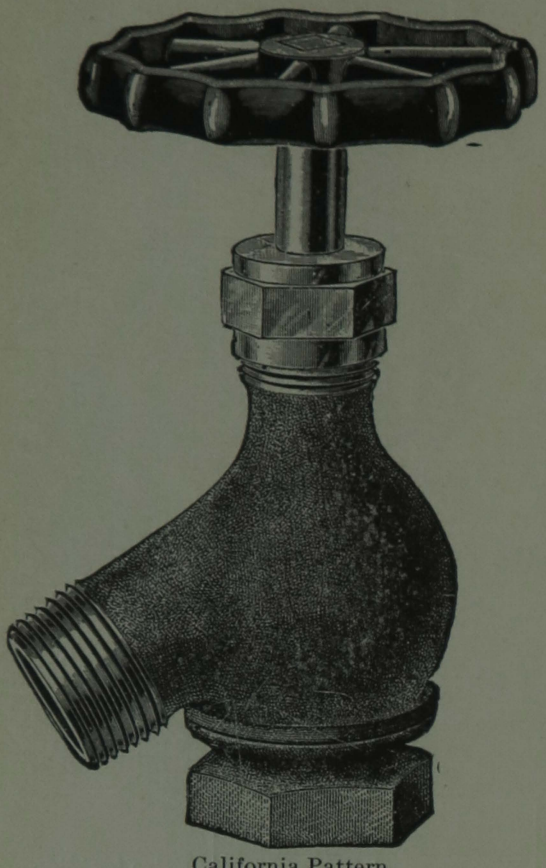
Size. Inches.	MEASUREMENTS.			PRICE.		Extra for Slide Stem and Lever.
	Diameter Standard Flange. Inches.	Face to Face of Screw Socket. Inches.	Face to Face of Flanges. Inches.	Screw Socket.	Flange.	
½	....	2¼	....	$ 1 40	.....	$ 80
¾	....	2½	....	1 80	.....	80
1	4	2⅞	3	2 35	.....	80
1¼	4⅜	3⅜	3⅜	3 40	$ 5 70	1 00
1½	5	3¾	3⅞	4 40	7 40	1 00
1¾	5¾	....	4 7/16	.....	.....	1 00
2	6	4⅛	4⅝	6 25	11 00	1 25
2½	6½	4 13/16	5⅜	13 75	18 75	1 75
3	7	5	6¼	15 50	21 50	2 00
3½	7½	5⅝	6⅞	23 50	30 50	2 00
4	9	6¼	7 1/16	34 00	43 00	2 00
4½	9½	7	7¾	45 00	55 00	2 25
5	10	7¼	8 3/16	52 00	64 00	2 25
6	11	7½	9	76 00	88 00	2 25

SLIDE STEM AND LEVER VALVES.

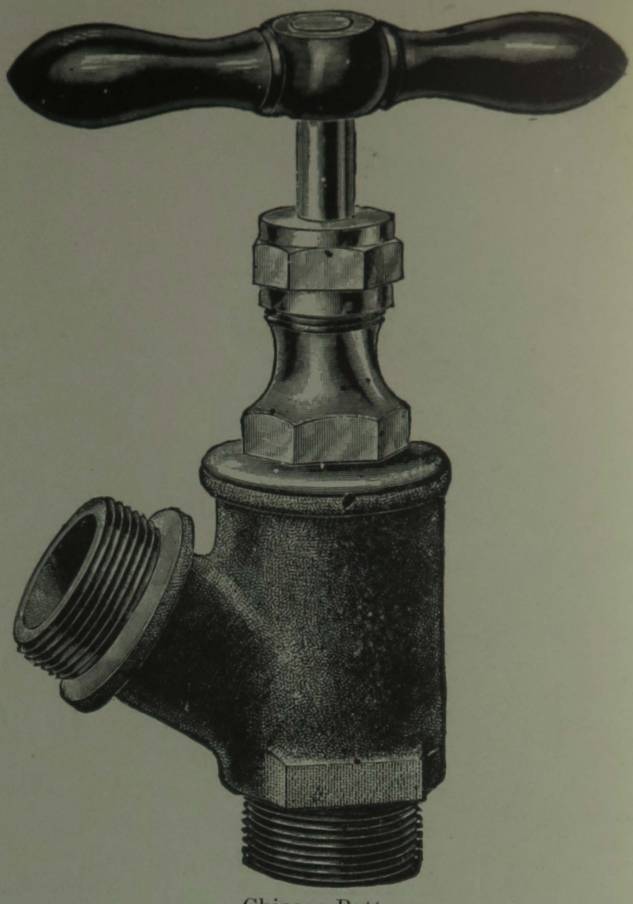
LUDLOW.

Our Slide Stem and Lever Valve has a simple arrangement by which the gate is held firmly at any desired point in opening and closing.

PRICES ON APPLICATION.



California Pattern.



Chicago Pattern.

HOSE VALVES.

CALIFORNIA PATTERN.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2
Price.....Each,	$1 65	1 65	2 20	3 40	4 75	7 00

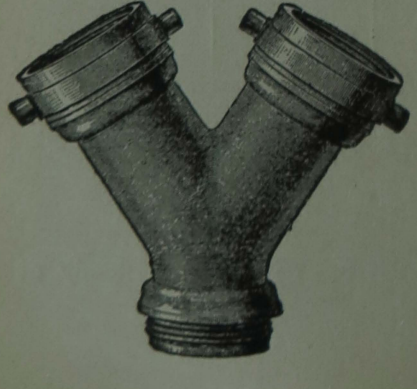
These Valves have iron pipe thread on bottom, and are made with either Chicago or California hose thread on side.

CHICAGO PATTERN.

LIST.

Size.....Inches,	1	1¼	1½	2	2½
Price.....Each,	$3 15	3 70	4 75	7 00	8 50

These Valves have standard iron pipe thread on bottom and Chicago standard hose thread on side, 1 to 2 inch, inclusive. The 2½ inch has the Chicago Fire Department thread on side



STAND PIPE SIAMESE.

LIST.

Size.....Inches,	2½
Price.....Each,	$10 00

EXTRA HEAVY REGRINDING VALVES,

BRASS.

TO STAND 350 POUNDS WORKING PRESSURE.

LUNKENHEIMER.

LIST.

Size.....Inches	½	¾	1	1¼	1½	2	2½	3	3½	4
Globe and Angle Valves, Screw Ends...Each	$1 80	2 40	3 50	4 90	7 00	10 50	17 50	27 75	40 30	52 80
Cross Valves, Screw Ends.....Each	2 50	3 50	4 90	7 00	9 50	13 75	22 20	35 00	51 40	66 60
Check Valves, Screw Ends.....Each	1 60	2 15	3 10	4 40	6 25	9 50	16 00	25 00	36 00	46 50
Globe Valves, Flange Ends.....Each	3 15	4 00	5 50	7 90	10 60	14 40	21 50	31 25	44 00	57 50
Diameter of Flanges.....Inches	3	3½	4	4½	5	6	7	7½	8½	9
Length Face to Face.....Inches	4	4½	5⅛	5¾	6¼	7½	8½	9	10¼	10¾
Angle Valves, Flange Ends.....Each	3 15	4 00	5 50	7 90	10 60	14 40	21 50	31 25	44 00	57 50
Diameter of Flanges.....Inches	3	3½	4	4½	5	6	7	7½	8½	9
Center to Inlet.....Inches	2	2¼	2 9/16	2⅞	3⅛	3¾	4¼	4½	5⅛	5⅜
Center to Outlet.....Inches	2	2¼	2 9/16	2⅞	3⅛	3¾	4¼	4½	5⅛	5⅜
Cross Valves, Flange Ends.....Each	4 00	5 25	7 00	9 75	13 40	18 75	26 25	37 50	58 00	75 00
Diameter of Flanges.....Inches	3	3½	4	4½	5	6	7	7½	8½	9
Face to Face across.....Inches	4	4½	5⅛	5¾	6¼	7½	8½	9	10¼	10¾
Center to Face of Bottom End.....Inches	2	2¼	2 9/16	2⅞	3⅛	3¾	4¼	4½	5⅛	5⅜
Check Valves, Flange Ends.....Each	2 85	3 60	5 00	7 30	9 85	13 50	20 00	28 50	40 00	52 00

WARRANTED TO STAND 175 POUNDS PRESSURE.

LIST.

Size.....Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3
Globe Valves.....Each	$0 70	0 70	0 85	1 15	1 45	2 00	2 80	3 90	6 20	12 00	16 50
Angle Valves.....Each	70	70	85	1 15	1 45	2 00	2 80	3 90	6 20	12 00	16 50
Finished all over, with Brass Wheel.....Each	1 75	1 90	2 15	2 50	3 10	3 65	5 25	7 25	10 75	22 00	33 50
Cross Valves.....Each	.....	1 00	1 00	1 50	2 00	2 70	3 50	5 10	8 00	16 00	24 00

Dimensions of Flanges on Check Valves, same as Globe Valves.

Also furnished with English standard flanges or threads without extra cost.

GATE VALVES.

QUICK OPENING.

BRASS. SCREWED.

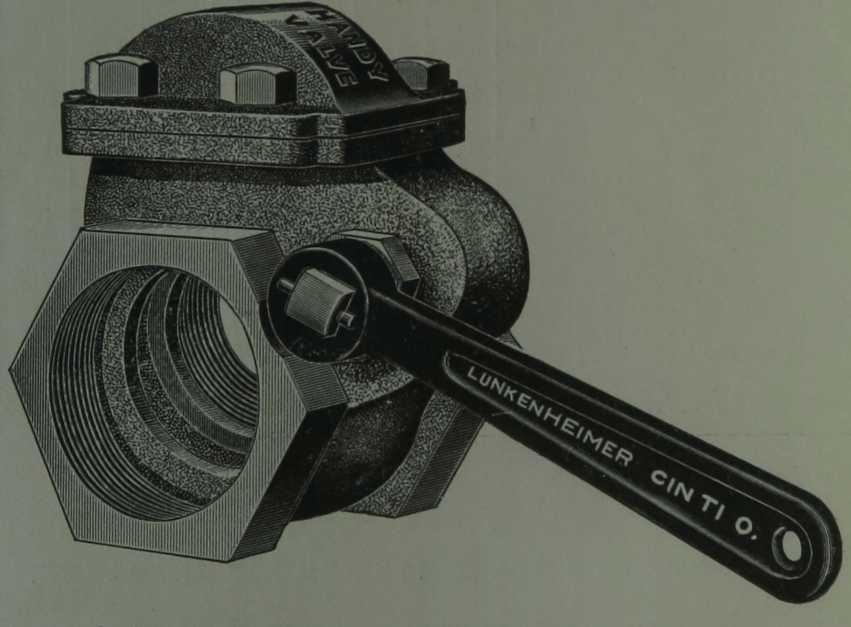
LIST.

Size.....Inches,	¾	1	1¼	1½	2	2½	3
Price.....Each,	$3 00	4 00	5 00	6 50	8 75	15 50	21 00
Distance end to end.....Inches,	2½	2⅞	3¼	3⅞	4	4½	5¼

IRON BODY. SCREWED.

LIST.

Size.....Inches,	2½	3	3½	4	5	6
Price.....Each,	$16 00	20 00	22 00	25 00	30 00	35 00
Distance end to end.....Inches,	6½	7	7½	7¾	9	9¾
Size.....Inches,	7	8	9	10	12	.....
Price.....Each,	$48 00	58 00	65 00	75 00	100 00	.....
Distance end to end.....Inches,	10½	11	12⅜	13	14½	.....



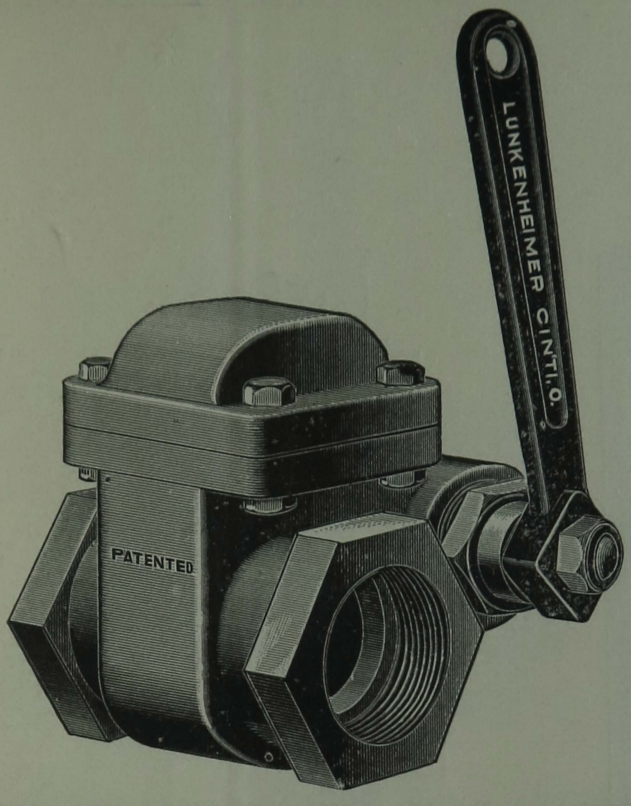
"HANDY" GATE VALVES.

SCREWED ENDS ONLY.

LIST.

Size.....Inches	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	8
Brass Body.....Each	$1 60	1 80	2 50	3 50	5 00	7 50	13 50	19 00	.....	60 00	.....	.....	.....	.....
Iron Body, Brass Trimmings.....Each	.....	.....	.....	.....	.....	9 00	12 00	15 00	18 00	21 00	25 00	30 00	35 00	65 00
All Iron.....Each	.....	.....	4 00	4 50	6 00	9 00	12 00	15 00	18 00	21 00	25 00	30 00	35 00	65 00

The "Handy" is also made in acid metal at special discount off brass list; also furnished threaded for casing pipe, or with English standard pipe thread.



LEVER THROTTLE VALVES.

LUNKENHEIMER.

LIST.

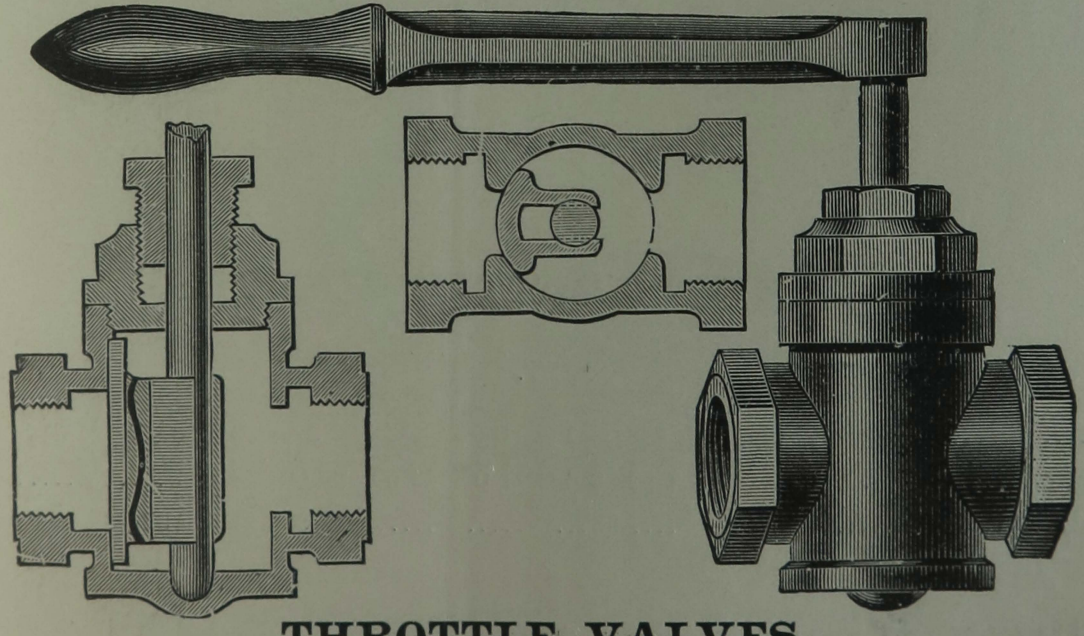
BRASS.—Screw Ends Only.

Size.....Inches,	¾	1	1¼	1½	2	2½
Brass Body.....Each,	$3 00	4 00	5 00	7 00	10 00	19 00

IRON.—Brass Mounted.

Size.....Inches,	2½	3	3½	4	5	6
Iron Body, Brass Mounted.....Each,	$16 00	20 00	25 00	30 00	35 00	40 00

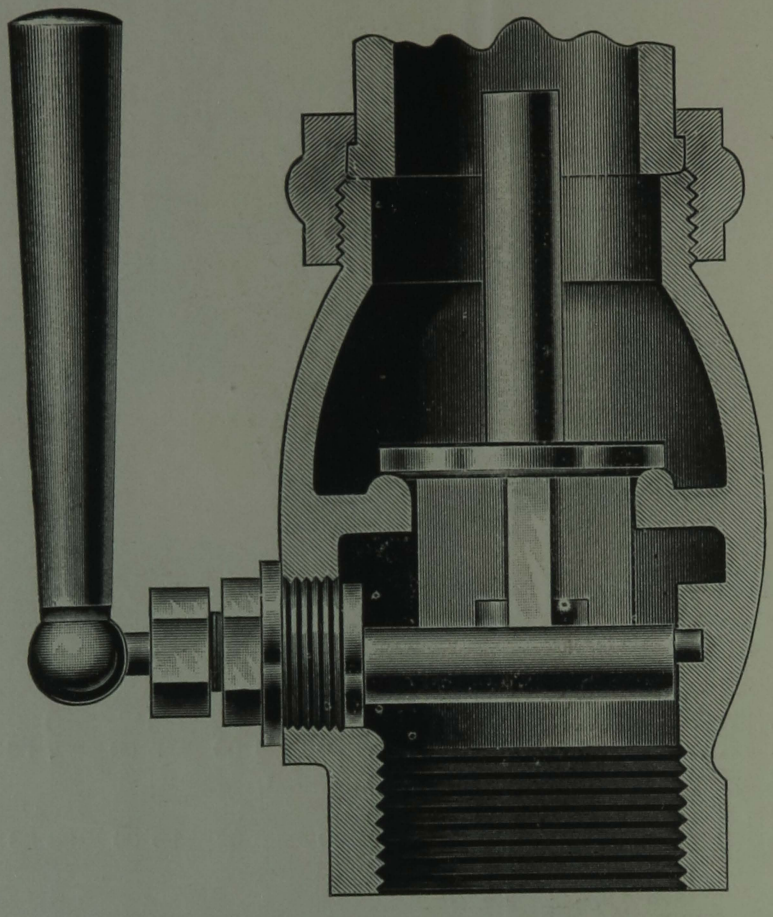
All Brass Valves are provided with Gun Metal Disc Carriers.



THROTTLE VALVES.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Brass.....Each,	$8 75	10 00	11 50	14 00	20 00	25 00	35 00	.....	.....	.....	.....	.....	.....
Iron Body, Each,	.....	.....	10 00	12 50	15 00	22 50	30 00	40 00	50 00	60 00	88 00	106 00	120 00



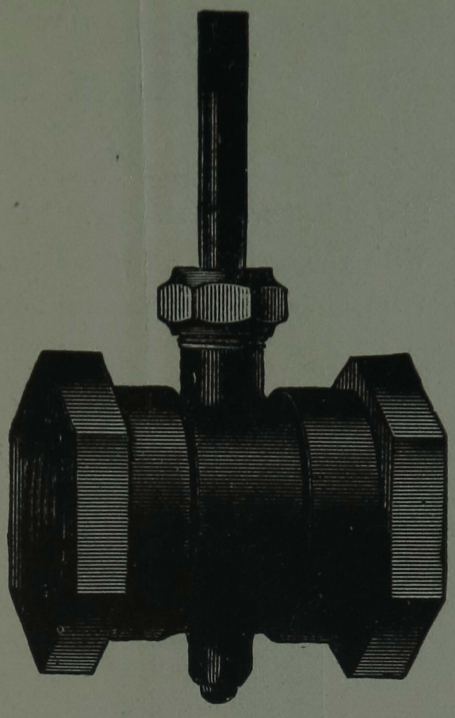
GILCHER THROTTLE VALVES.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2	2½	3	3½	4
Brass Body.....	$ 6 50	7 50	9 00	11 00	13 00	20 00	30 00	.....	.....	.....
Iron Body.....	....	....	....	.....	.....	18 00	24 00	32 00	40 00	48 00

All valves provided with Jenkins Discs unless ordered otherwise.

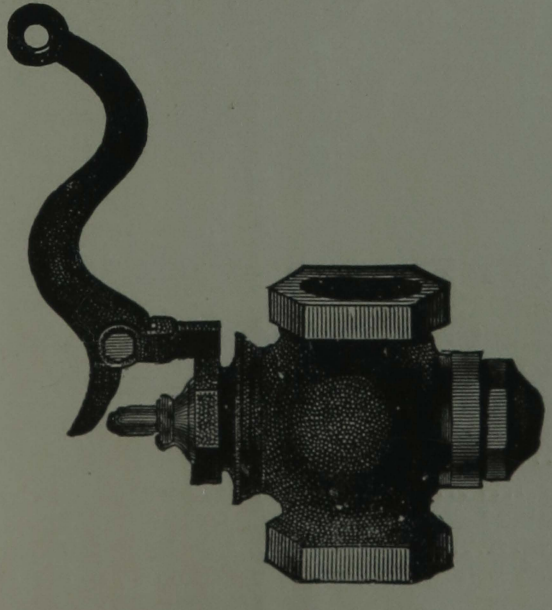
We furnish lever according to size of valve. Also furnish all throttle valves with union, as shown in cut. There is provided in union stop and guide for stem of valve. This valve can be shut off instantly, in case of accident; this is a great feature.



BUTTERFLY VALVES.

LIST.

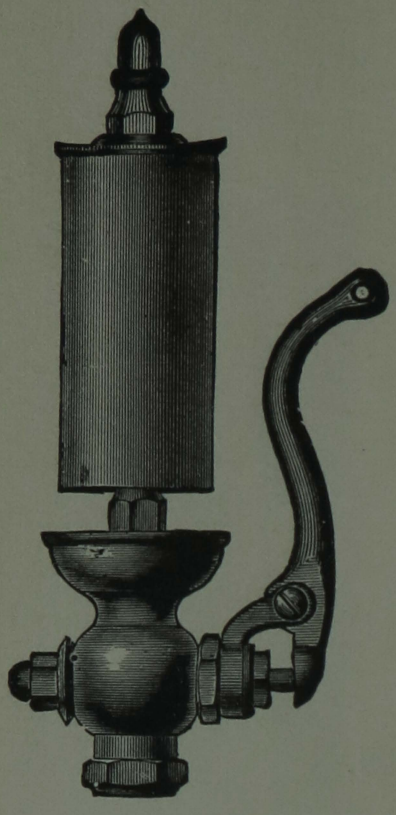
Size.....Inches,	¾	1	1¼	1½	2	2½	3	3½	4	5	6
Brass.....Each,	$3 10	4 40	5 65	6 75	10 00	13 75	21 00	.....	.....	.....	.....
Iron Body.....Each,	....	....	6 35	7 00	8 00	9 50	12 00	16 00	18 50	28 50	42 50



WHISTLE VALVES.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2	2½	3
Brass.....Each,	$2 50	3 00	3 50	5 00	6 00	9 00	18 00	27 00

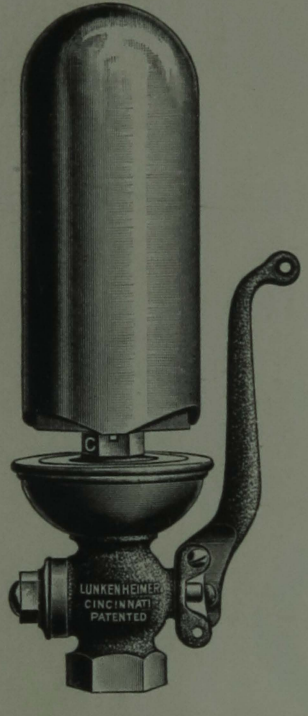


STEAM WHISTLES.

LIST.

Size of Bell.....Inches,	1	1¼	1½	2	2½	3
With Valve, Brass...Each,	$ 3 10	3 75	4 00	5 50	6 50	8 50
Without Valve, Brass. Each,	2 20	2 75	3 00	4 35	5 25	7 25

Size of Bell.....Inches,	3½	4	5	6	8	....
With Valve, Brass...Each,	$11 50	15 00	22 50	33 00	95 00	....
Without Valve, Brass. Each,	9 50	12 00	19 00	24 00	70 00	....



IMPROVED BRASS STEAM WHISTLES.

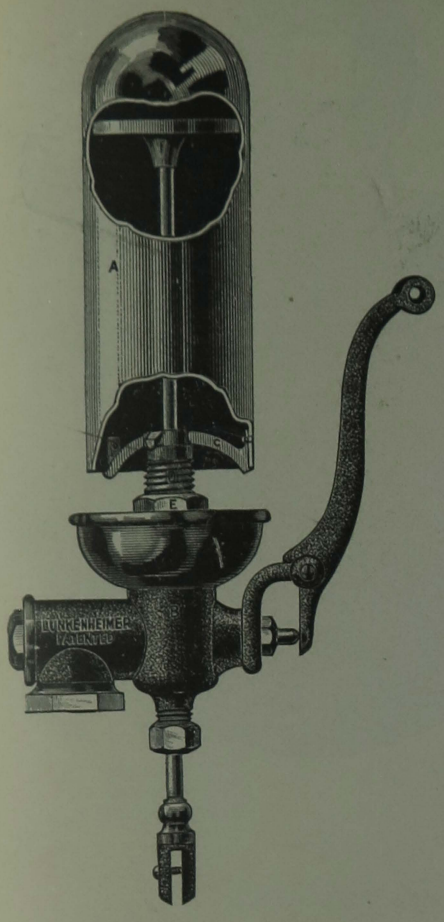
LUNKENHEIMER'S.

LIST.

Diameter of Bells.....Inches,	1	1¼	1½	2	2½	3
Size of Pipe Connection.....Inches,	¼	¼	⅜	½	¾	¾
Brass Whistles, with Adjustable Lever.....Each,	$ 3 50	3 75	4 00	4 75	6 50	8 00
Brass Whistles, without Valve.....Each,	1 70	2 00	2 50	3 25	4 50	6 00
Brass Whistles, without Valve, Long Bell.....Each,	.....	.....	.....	.....	.....	7 50

Diameter of Bells.....Inches,	3½	4	5	6	8	10
Size of Pipe Connection.....Inches,	1	1¼	1½	1½	2	2½
Brass Whistles, with Adjustable Lever.....Each,	$11 00	14 00	22 00	30 00	80 00	175 00
Brass Whistles, without Valve.....Each,	8 50	11 00	18 00	24 00	65 00	125 00
Brass Whistles, without Valve, Long Bell.....Each,	10 25	13 50	22 00	31 00	80 00	145 00

Bells on Long Bell Whistles are about three times the diameter.



IMPROVED COMBINATION OR FIRE ALARM WHISTLES.

This whistle is designed to answer both the purposes of an ordinary whistle as well as that of a Fire Alarm. It is provided with a piston that can be moved up or down within the bell or tube, thus changing the interior length of same and consequently the sound of the whistle. When the piston is not operated the whistle gives but one sound, like any ordinary whistle, but when pulled up and down, a howling, penetrating noise is produced. When placed above the roof of a building an extension rod should be coupled to the piston stem and a rope or wire to the whistle valve lever. The bell is dome-shaped at its upper end and at its lower securely supported by a three-armed spider, the stem of which is adjustably screwed into the whistle base and fastened by a jam-nut (E). Owing to this construction the lower edge of the bell is always exactly in line with the slot in the base through which the steam escapes, insuring best results and a perfect, clear and loud tone. The bell is raised or lowered to suit steam pressure by screwing it up or down, and when properly set, is fastened by jam-nut (E).

LIST.

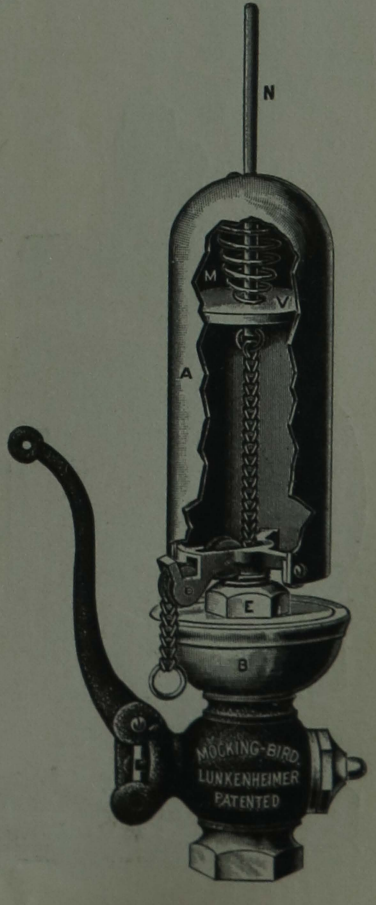
Diameter of Bells.....Inches,	2½	3½	5	8
Size Pipe Connection.....Inches,	¾	1	1½	2
Price, Whistle Valve complete..Each,	$15 00	20 00	23 00	55 00

MOCKING-BIRD WHISTLES.

A simple and practical variable sound steam whistle. Attached like any ordinary whistle. The bell is provided with a piston, which is pulled downward by a chain running between pulleys, and, when not in use, is always at the top, being drawn upward by means of a spring. To change the sound, pull the chain.

The dome-shaped bell is securely supported at its base by a three-armed prong, the stem of which is adjustably screwed into the whistle base, and fastened by jam-nut (E).

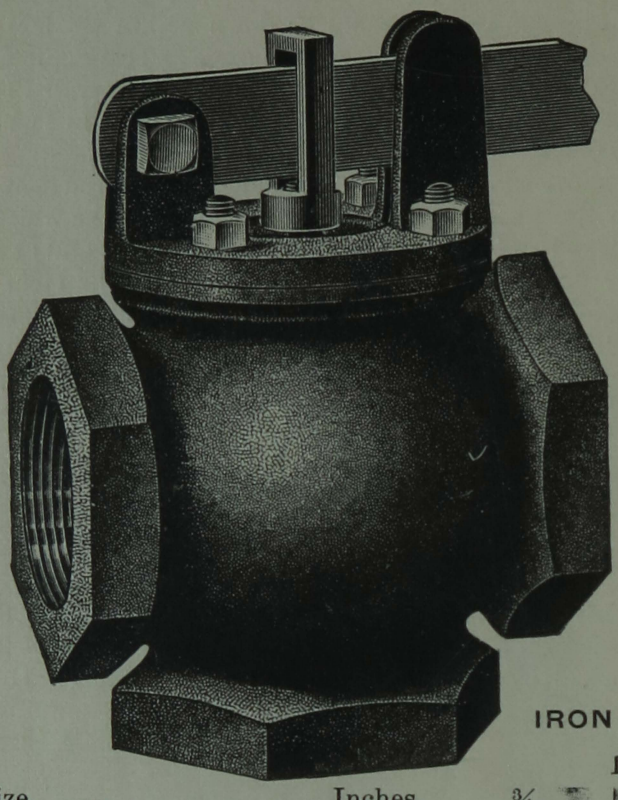
Owing to this construction, the lower edge of the bell is always exactly in line with the slot in the base through which the steam escapes, thereby insuring best results and a perfect, clear and loud tone. The bell must be raised or lowered to suit the steam pressure by screwing same up or down, and when properly set, fastened by jam-nut (E).

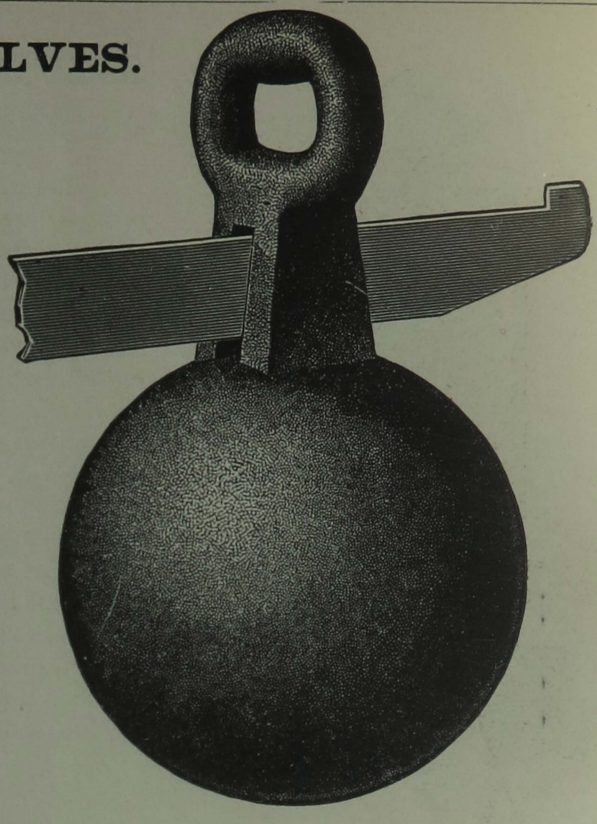


LIST.

Diameter of Bells.....Inches,	2	2½	3	3½	4	5	6
Size of Pipe Connection. Inches,	½	¾	¾	1	1¼	1½	1½
All Brass, with Valve....Each,	$8 00	10 50	14 00	20 00	28 00	40 00	56 00
All Brass, without Valve. Each,	7 00	9 00	12 00	17 50	25 00	37 00	50 00
Iron Base, without Valve. Each,	....	....	11 50	16 50	23 00	34 00	46 00

SAFETY VALVES.

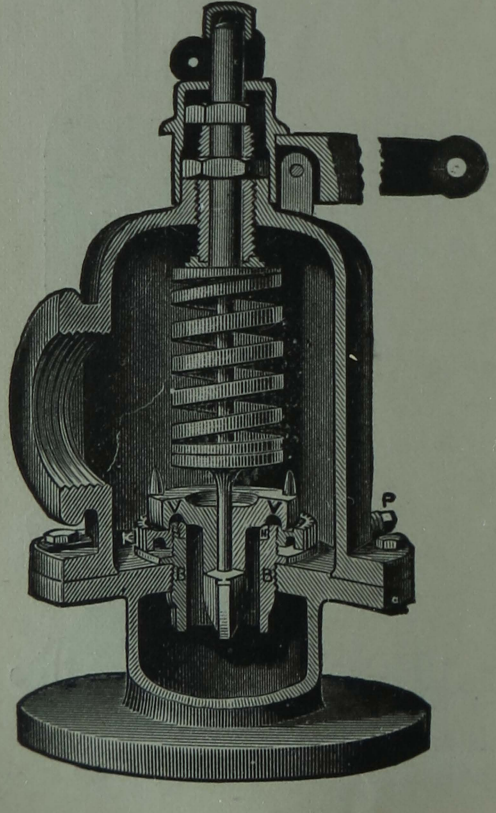




IRON BODY. BRASS MOUNTED.

LIST.

Size.. .....Inches,	¾	1	1¼	1½	2	2½	3
Screwed.....Each,	$ 3 50	4 00	5 00	5 80	7 80	13 25	17 25
Size. .....Inches,	3½	4	4½	5	6	7	8
Screwed. ....Each,	$23 00	28 75	34 50	41 50	57 75	93 50	132 00



CRANE'S POP SAFETY VALVES.

IRON BODY.

LIST.

Size. Inches.	Center of Valve to End Outlet. Inches.	Size of Flang'd Outlets. Inches.	Total Height. Inches.	C'nt'r of Outl't to Bot'm Fl'ge. Inches.	Diameter of Fl'ge. Bot'm. Inches.	Center of Valve to End Lever. Inches.	Largest Diam. of Valve. Inches.	For Boilers. H.-P.	Price.
2½	3¾	....	16	6½	9⅜	12	9⅜	60 to 75	$45 00
3	4¼	....	17½	7¼	9⅜	12	9⅜	75 to 100	60 00
3½	4¾	....	19¾	7¼	10⅜	13¾	10⅜	100 to 125	75 00
4	5⅜	....	21½	8¼	11⅜	13¾	11⅜	125 to 150	90 00
4½	6¼	9⅛	22¼	10¾	12	13¾	12	150 to 175	95 00
5	6¼	9⅛	22¼	10¾	13⅛	15	13⅛	175 to 200	100 00
5½	6⅞	10⅛	24	11	13¼	17	13¼	200 to 275	125 00
6	6⅞	10⅛	24	11	13¼	19	13¼	300	150 00

SAFETY VALVES—Continued.

DIRECTIONS.

To Take Valve Apart: Use the key to unscrew lock-screw, take off the top and relieve the load on spring by unscrewing the set-screw. Then take off lever and unscrew the casing.

To Set Valve at a Higher Pressure: Screw set-screw down; at a lower pressure, screw set-screw up.

To Regulate Pop: The pop or action of the escaping steam is regulated by the threaded ring on the disc of valve.

If the valve pops too suddenly and reduces the pressure too much, turn ring UP (further away from the valve seat), and if it does not pop enough, opening and closing only gradually, then turn ring DOWN (nearer to the valve seat). When the desired adjustment is obtained, secure the ring by inserting the pin; whenever set-screw is changed, the pop regulating ring must in most cases also be changed to suit.

To insure proper working, pop safety valves should be attached immediately upon the boiler, or as close to same as possible; otherwise the connecting pipe should be at least one size larger in diameter than the size of the pop valve.

POP SAFETY VALVES.

LUNKENHEIMER'S.

LIST.

Size Pipe. Inches.	Brass, Top Outlet. Each.	Brass, Side Outlet. Each.	Capacity for Boilers. Horse-Powers.
3/8	$ 5 50	$ 5 50	3
1/2	6 00	6 00	5
3/4	6 50	6 50	8
1	7 50	7 50	10
1 1/4	9 00	9 00	15
1 1/2	11 50	11 50	20
2	18 00	18 00	30
2 1/2	28 00	28 00	60 to 75
3	38 00	38 00	75 to 100

CRANE'S POP SAFETY VALVES.

BRASS.

LIST.

Size. Inches.	Size Steam Connections. Inches.	Height. Inches.	Largest Diameter. Inches.	For Boilers. Horse-Powers.	Price.
3/4	3/4	5 3/8	2	3 to 6	$ 8 00
1	1	6 1/2	2 3/8	3 to 10	10 00
1 1/4	1 1/4	6 3/4	2 1/8	10 to 20	15 00
1 1/2	1 1/2	7 5/8	3 1/4	20 to 30	20 00
2	2	9 1/4	4	30 to 40	30 00

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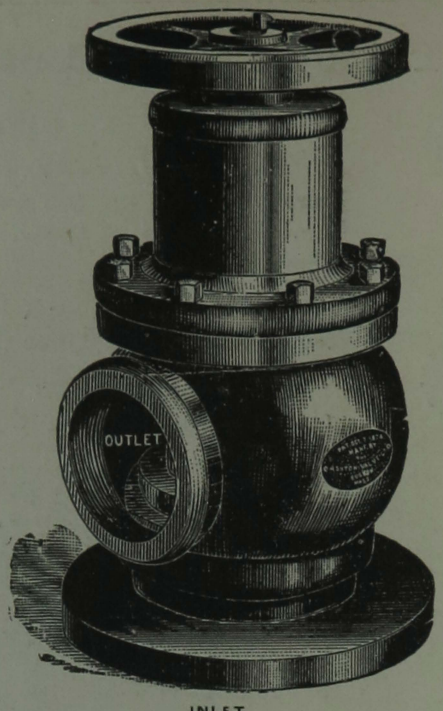


INLET.

RELIEF VALVES.

LIST.

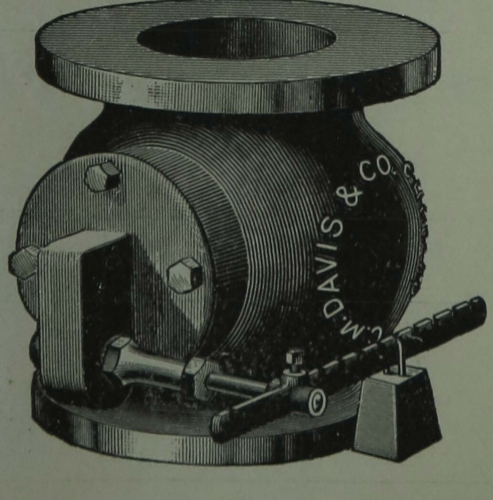
Size. Inches.	Center of Valve to End of Outlet. Inches.	Size of Flanged Outlet. Inches.	Total Height.	Center of Outlet to Bottom of Flange. Inches.	Diameter of Flange. Bottom. Inches.	Largest Diameter of Valve. Inches.	PRICE.
2½	3¾	....	16	6½	9⅜	9⅜	$ 45 00
3	4¼	....	17½	7¼	9⅜	9⅜	60 00
3½	4¾	....	19¾	7¼	10⅜	10⅜	75 00
4	5⅜	....	21½	8¼	11⅜	11⅜	90 00
4½	6¼	9⅛	22¼	10¾	12	12	95 00
5	6¼	9⅛	22¼	10¾	13⅛	13⅛	100 00
5½	6⅞	10⅛	24	11	13¼	13¼	125 00
6	6⅞	10⅛	24	11	13¼	13¼	150 00

These Valves are similar in construction to the Pop Safety Valves, and are designed for the purpose of giving instantaneous and automatic relief to water chambers in steam pumps, etc. When ordering, state highest working pressure. To adjust for different pressures, loosen lock-nut, turn hand-wheel to right to increase pressure, turn hand-wheel to left to decrease pressure. Made for wrench adjustment in place of hand-wheel when so ordered.

DAVIS' NOISELESS BACK-PRESSURE VALVES.

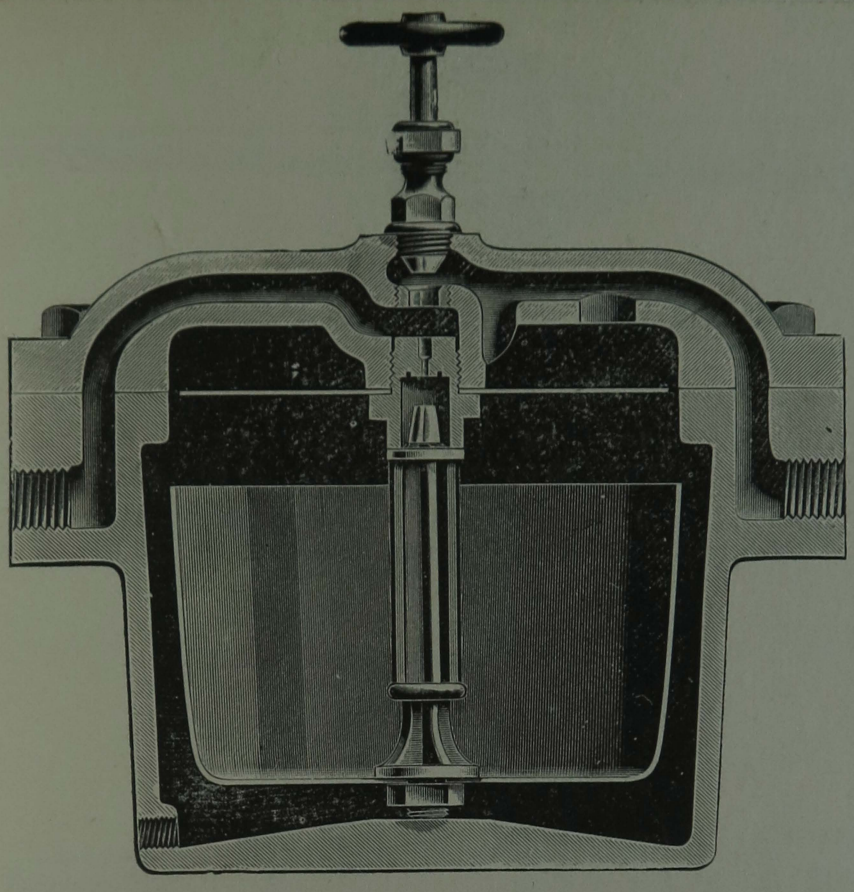
LIST.

Size. Inches.	SCREWED.	Price.
2	.....	$14 00
2½	.....	16 00
3	.....	18 00
3½	.....	22 00
4	.....	25 00
4½	.....	30 00
5	.....	40 00
6	.....	60 00
7	.....	80 00



LIST.

Size. Inches.	FLANGED.	Price.
8	14-inch Flange.	$ 100 00
10	17-inch Flange.	145 00
12	19-inch Flange.	220 00
14	21-inch Flange.	345 00
16	24-inch Flange.	465 00
18	26-inch Flange.	600 00
20	29-inch Flange.	750 00
22	31-inch Flange.	900 00
24	34-inch Flange.	1,050 00



BUFFALO IMPROVED STEAM TRAPS.

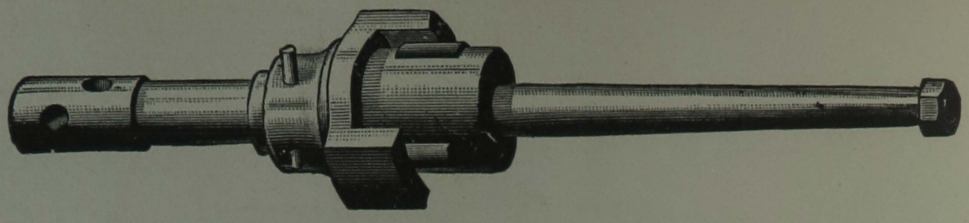
A thoroughly reliable and efficient Receiving Steam Trap. To the economical and continuous working of any heating plant, it is essential that the water of condensation be either returned directly to the boilers, or constantly withdrawn by the aid of some device, which, while allowing the free discharge of water, will prevent the escape or loss of steam. The action and construction of the Buffalo Improved Steam Trap for this service is made clearly apparent by the cut.

The largest sizes of Buffalo Steam Traps are provided with a small cover or hand-hole, which may readily be detached for the purpose of inspecting the working parts, or removal of accummulations, thus avoiding the usual and tedious alternative of taking off the whole top of the trap, common to other forms of trap construction.

Though these traps are especially adapted for use in conjunction with Buffalo Hot Blast Heaters, their prominent points of merit readily recommend them for service on any arrangement which requires the removal of water of condensation. The action of the Buffalo Improved Steam Trap is entirely automatic. The discharge or delivery is periodic, dependent upon the amount of condensation of the coil, and continues as long as there is water to be discharged.

LIST.

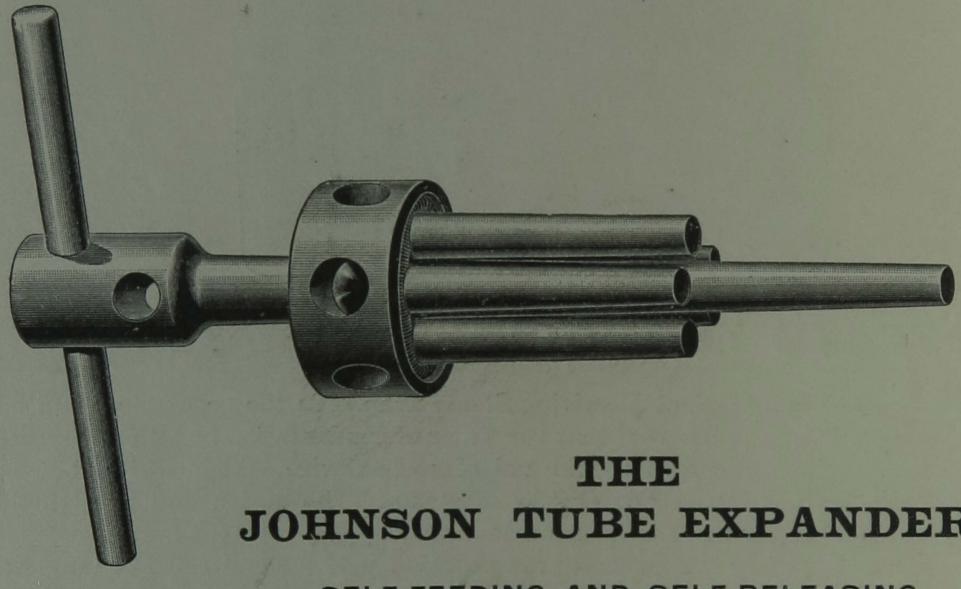
Numbers.	Size of Pipe Connections. Inches.	Diameter Outside of Flanges. Inches.	Diameter of Cylinder. Inches.	Height to Top of Valve. Inches.	Height to Top of Cover. Inches.	Maximum Dis. per Minute. Pounds.	Amount Max. Buffalo Hot Blast Heating Surface.	Maximum Amount of Lineal Ft. 1-inch Pipe.	Price.
1	½	10¾	8	11	8	2	350	1050	$16 00
2	¾	14¼	10½	14	10	5	900	2700	22 00
3	1	15¾	12	16¼	12	8	1400	4200	27 50
4	1¼	19	14	18½	14	12	2000	6000	42 50
5	1½	24¼	18	23½	15½	20	3500	10500	70 00



ROLLER TUBE EXPANDERS.

LIST.

Size.....Inches,	1	1¼	1½	1¾	1⅞	2	2¼	2½	2¾
Price.....Each,	$10 00	10 00	10 00	10 00	10 00	10 00	12 00	14 00	16 00
Size.....Inches,	3	3¼	3½	3¾	4	4¼	4½	5	6
Price.....Each,	$18 00	20 00	23 00	25 00	30 00	35 00	40 00	50 00	60 00



THE JOHNSON TUBE EXPANDERS.

SELF-FEEDING AND SELF-RELEASING.

LIST.

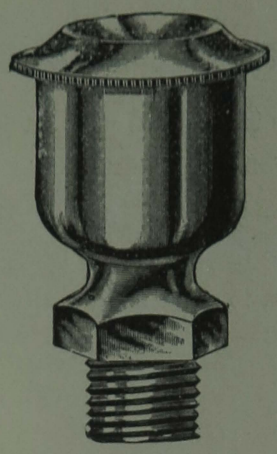
Size.....Inches,	1	1¼	1½	1¾	2	2¼	2½	2¾
Price.....Each,	$15 00	16 00	18 00	20 00	22 00	24 00	26 00	30 00
Size.....Inches,	3	3¼	3½	3¾	4	4½	5	6
Price.....Each,	$35 00	40 00	44 00	48 00	54 00	64 00	70 00	80 00

ROLLER EXPANDERS.

(Dugdeon Pattern.)

LIST.

Size.....Inches,	1	1¼	1½	1¾	1⅞	2	2¼
Price.....Each,	$ 7 00	7 00	8 00	9 00	10 00	10 00	12 00
Extra Mandrels.....Each,	1 00	1 50	1 75	2 00	2 50	2 50	3 00
Extra Rolls.....Each,	50	60	70	80	90	1 00	1 15
Size.....Inches,	2½	2¾	3	3¼	3½	3¾	4
Price.....Each,	$14 00	16 00	18 00	20 00	23 00	25 00	28 00
Extra Mandrels.....Each,	3 50	3 50	4 00	4 50	5 00	5 75	6 50
Extra Rolls.....Each,	1 30	1 45	1 60	1 75	2 00	2 25	2 50



BRASS OIL CUPS.

LIST.

Size.....Inches,	⅝	¾	⅞	1	1⅛	1¼	1½	1¾	2	2¼	2½	2¾	3
Price.....Each,	$0 25	0 30	0 35	0 40	0 50	0 60	0 90	1 25	1 75	2 25	2 75	3 50	4 00

"PIONEER" SLIDE TOP GLASS OIL CUPS.

LIST.

Numbers.....	000	00	0	1	1½	2	3	4	5	6
Outside Diameter of Glass.....Inches,	1	1⅛	1¼	1½	1¾	2	2¼	2½	3	3½
Height of Glass.....Inches,	⅞	1	1⅛	1⅜	1⅝	1⅞	2⅛	2⅜	3	4
Capacity.....Ounces,	¼	½	⅝	1	1½	2½	4	5	10	18
Pipe Thread.....Inches,	⅛	⅛	⅛	¼	¼	⅜	⅜	⅜	½	½
Finished Brass.....Each,	$0 70	0 75	0 80	1 00	1 25	1 50	1 90	2 40	3 10	4 00
Nickel Plated.....Each,	80	85	95	1 20	1 50	1 75	2 20	2 75	3 50	4 50
Extra Glasses.....Each,	05	06	08	10	10	12	15	25	35	65

When ordering Glasses and Cork Washers, specify name and number of cup, as stamped on same.

"VICTOR" INDEX GLASS OIL CUPS.

The "Victor" Index Glass Oil Cup is provided with a simple "index" device for regulating the feed of oil, and has an indicator arm pivoted on the stem and turning on the lid to mark the notch giving the desired feed. The feed can be instantly turned off, and on again, by replacing the lever in the notch of the indicator arm. When the index arm is closed the lever can be left to stand up out of the notch, thus acting as an indicator, to show from a distance that the feed is shut off.

LIST.

Numbers	0	1	1½	2	3	4	5	6
Outside Diameter of Glass....Inches,	1¼	1½	1¾	2	2¼	2½	3	3½
Height of Glass....Inches,	1⅛	1⅜	1⅝	1⅞	2⅛	2⅜	3	4
Capacity....Ounces,	⅝	1	1½	2½	4	5	10	18
Pipe Thread....Inches.	⅛	¼	¼	⅜	⅜	⅜	½	½
Finished, Brass....Each,	$ 1 00	1 20	1 45	1 75	2 15	2 70	3 40	4 30
Nickel Plated....Each,	1 15	1 40	1 70	2 00	2 45	3 05	3 80	4 80
Extra Glasses....Each,	08	10	10	12	15	25	35	65

"YANKEE" SLIDE TOP GLASS OIL CUPS.

This Cup, on account of being simple, efficient and low priced, is admirably adapted as a shafting cup, but is also suitable for general machinery and engine bearings.

LIST.

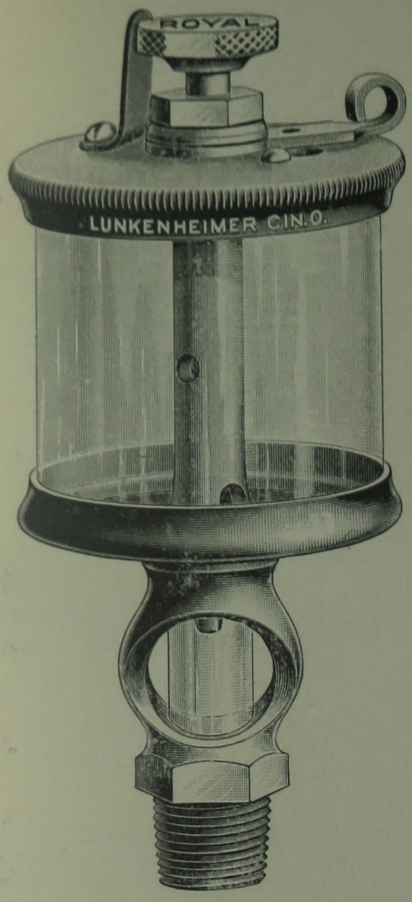
* Numbers	00	0	1	1½	2	3	4	5	6
Outside Diameter of Glass....Inches,	1⅛	1¼	1½	1¾	2	2¼	2½	3	3½
Capacity....Ounces,	½	⅝	1	1½	2½	4	5	10	18
Pipe Thread....Inches,	⅛	⅛	¼	¼	⅜	⅜	⅜	½	½
Finished, Brass....Each,	$ 0 75	0 80	1 00	1 25	1 50	1 90	2 40	3 10	4 00
Nickel Plated....Each,	85	95	1 20	1 50	1 75	2 20	2 75	3 50	4 50
Extra Glasses....Each,	06	08	10	10	12	15	25	35	65

"AJAX" INDEX GLASS OIL CUPS.

LIST.

Numbers	0	1	1½	2	3	4	5	6
Outside Diameter of Glass....Inches,	1¼	1½	1¾	2	2¼	2½	3	3½
Capacity....Ounces,	⅝	1	1½	2½	4	5	10	18
Pipe Thread....Inches,	⅛	¼	¼	⅜	⅜	⅜	½	½
Finished, Brass....Each,	$ 1 00	1 20	1 45	1 75	2 15	2 70	3 40	4 30
Nickel Plated....Each,	1 15	1 40	1 70	2 00	2 45	3 05	3 80	4 80
Extra Glasses....Each,	08	10	10	12	15	25	35	65

When ordering Glasses and Cork Washers, specify name and number of cup as stamped on same.



"ROYAL" SIGHT-FEED GLASS OIL CUPS.

The Royal Sight-Feed Glass Oil Cup will be found an excellent cup for engine and dynamo use; it is simple and practical, and so constructed, that when the desired feed is once set it can be stopped and started at will without resetting, the spring acting as a lock and indicator when engaging at (E).

DIRECTION TO SET FEED.—Regulate the feed by turning the milled cover, so that when the flattened side of thumb-nut engages the spring the desired feed is obtained. When the desired feed is once established, it can instantly be shut off or put on by turning the milled thumb-nut (E); *i. e.*, to the right, feed off; to the left, feed on.

LIST.

Numbers	00	0	1	1½	2	3	4	5	6
Outside Diam. Glass.In.,	1⅛	1¼	1½	1¾	2	2¼	2½	3	3½
Height of Glass...Inches,	1	1⅛	1⅜	1⅝	1⅞	2⅛	2⅜	3	4
Capacity.....Ounces,	½	⅝	1	1½	2½	4	5	10	18
Pipe Thread.....Inches,	⅛	⅛	¼	¼	⅜	⅜	⅜	½	½
Finished, Brass... Each,	$1 10	1 25	1 50	1 75	2 10	2 55	3 15	3 90	4 80
Nickel Plated.....Each,	1 20	1 40	1 70	2 00	2 35	2 85	3 50	4 30	5 30
Extra Glasses.....Each,	06	08	10	10	12	15	25	35	65

"CROWN" INDEX SIGHT-FEED GLASS OIL CUPS.

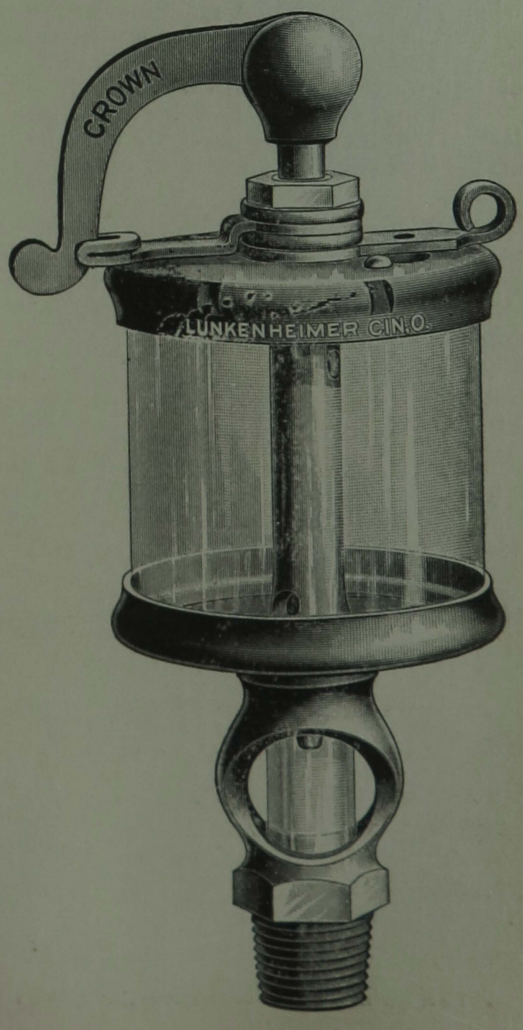
The "Crown" Index Sight-Feed Glass Oil Cup has an "index" device for regulating the feed of oil, and an indicator arm turning on the lid to mark the notch giving the desired feed. The feed can be instantly turned off and on again by replacing the index lever in the notch of the indicator arm. When the index arm is closed, the lever can be left to stand up out of the notch, thus acting as an indicator, to show from a distance that the feed is shut off.

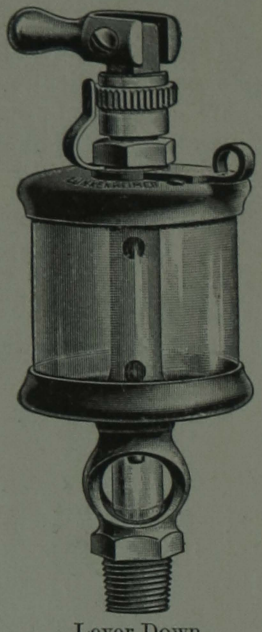
LIST.

Numbers	0	1	1½	2
Outside Diam. of Glass....In.,	1¼	1½	1¾	2
Height of Glass.....Inches,	1⅛	1⅜	1⅝	1⅞
Capacity .....Ounces,	⅝	1	1½	2½
Pipe Thread .....Inches,	⅛	¼	¼	⅜
Finished, Brass.....Each,	$1 25	1 50	1 75	2 10
Nickel Plated.....Each,	1 40	1 70	2 00	2 35
Extra Glasses.....Each,	08	10	10	12

Numbers..	3	4	5	6
Outside Diam. of Glass ...In.,	2¼	2½	3	3½
Height of Glass.....Inches,	2⅛	2⅜	3	4
Capacity .....Ounces,	4	5	10	18
Pipe Thread.....Inches,	⅜	⅜	½	½
Finished, Brass.....Each,	$2 55	3 15	3 90	4 80
Nickel Plated.....Each,	2 85	3 50	4 30	5 30
Extra Glasses.....Each,	15	25	35	65

When ordering Glasses and Cork Washers, specify name and number of cup, as stamped on same.



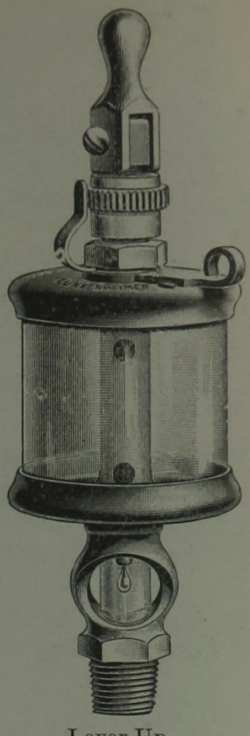


Lever Down,
Showing Feed Stopped.

"SENTINEL"

GLASS OIL CUPS.

SNAP LEVER, SIGHT-FEED.



Lever Up,
Showing Cup Feeding.

The "Sentinel" Snap Lever, Sight-Feed, Glass Oil Cup, is simple in operation, compact, well made and not liable to get out of order. Owing to its construction, the cup will not shake to pieces when placed on jarring machinery; neither will the feed unset when either raising or lowering lever, as the curved spring which presses against the milled regulating nut prevents it from turning.

Another advantage it has is that, when set to feed a given amount of oil, it will hold up its rate of feed until cup is entirely emptied.

DIRECTIONS TO SET FEED.—Raise the lever and turn the milled thumb-nut until the desired feed is obtained. The feed can be shut off by lowering the lever. When the lever is set at an angle of 45° it raises feed stem clear off its seat and cup flushes.

LIST.

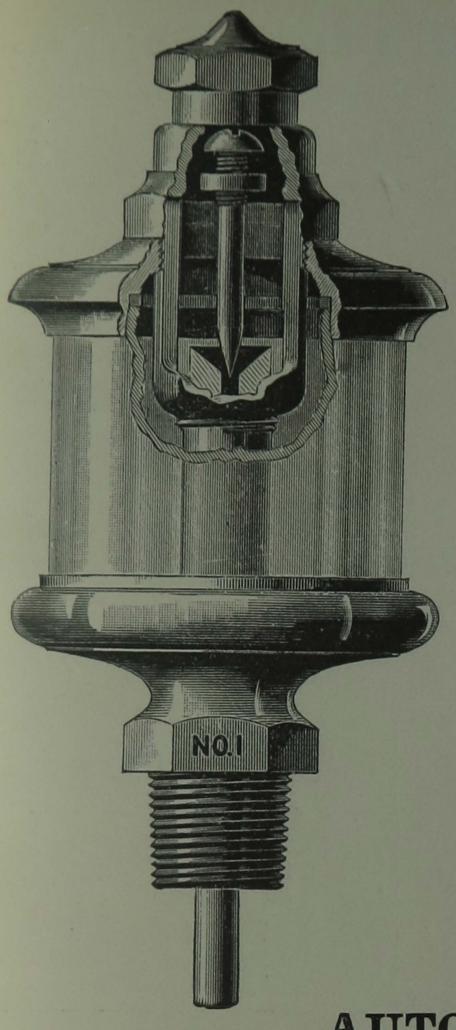
Numbers		0	1	1½	2	3	4	5	6
Outside Diameter of Glass	Inches,	1¼	1½	1¾	2	2¼	2½	3	3½
Height of Glass	Inches,	1⅛	1⅜	1⅝	1⅞	2⅛	2⅜	3	4
Capacity		⅝ oz.	1 oz.	1½ oz.	2½ oz.	¼ pt.	⅓ pt.	½ pt.	1 pt.
Pipe Thread	Inches,	⅛	¼	¼	⅜	⅜	⅜	½	½
Finished	Each,	$3 00	3 25	3 50	3 75	4 25	5 25	7 25	9 25
Nickel Plated	Each,	3 50	3 75	4 00	4 25	4 75	5 75	8 00	10 25
Extra Glasses	Each,	08	10	10	12	15	25	35	65

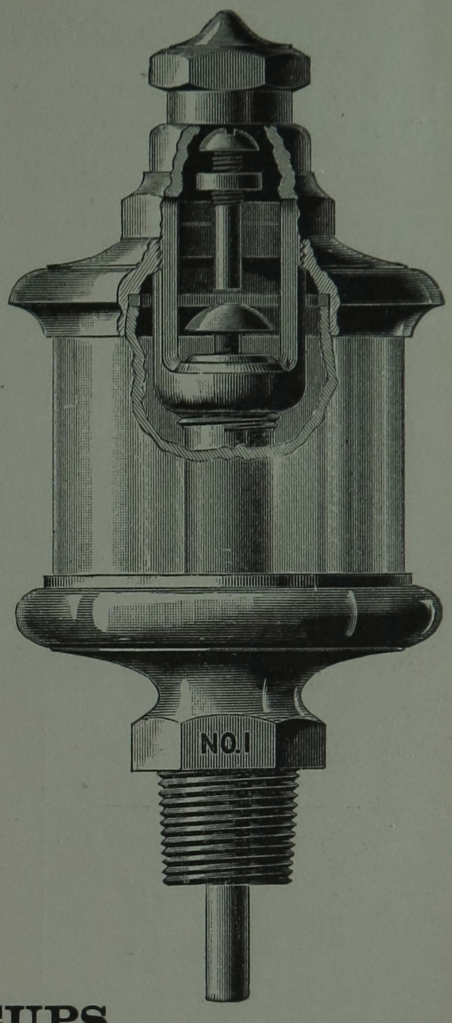
"RUBY" INDEX SIGHT FEED GLASS OIL CUPS.

LIST.

Numbers		0	1	1½	2	3	4	5	6
Outside Diameter of Glass	Inches,	1¼	1½	1¾	2	2¼	2½	3	3½
Capacity	Ounces,	⅝	1	1½	2½	4	5	10	18
Pipe Thread	Inches,	⅛	¼	¼	⅜	⅜	⅜	½	½
Finished, Brass	Each,	$1 25	1 50	1 75	2 10	2 55	3 15	3 90	4 80
Nickel Plated	Each,	1 40	1 70	2 00	2 35	2 85	3 50	4 30	5 30
Extra Glasses	Each,	08	10	10	12	15	25	35	65

When ordering Glasses and Cork Washers, specify name and number of cup as stamped on same.





AUTOMATIC ROD CUPS.

FOR ENGINE CRANK PINS.

The Automatic Screw Feed and Needle Valve Rod Cups are unexcelled for use on engine or other crank bearings. They are simple, compact, strong and well made, with no complicated parts, thus are not liable to get out of order, nor will they throw and waste oil, as is the case with other makes. Thousands of them are in use to-day, and are giving excellent satisfaction. The Needle Valve Cups are not made smaller than No. 1. When ordering mention whether Screw Feed or Needle Valve Feed are wanted.

LIST.

Numbers	0	1	1½	2	3	4
Outside Diameter of Glass....Inches,	1¼	1½	1¾	2	2¼	2½
Height of Glass....Inches,	1⅛	1⅜	1⅝	1⅞	2⅛	2⅜
Capacity....Ounces,	⅝	1	1½	2½	4	5
Pipe Thread....Inches,	⅛	¼	¼	⅜	⅜	⅜
Finished, Brass....Each,	$ 1 10	1 50	2 00	2 50	3 00	4 00
Nickel Plated....Each,	1 25	1 70	2 25	2 75	3 30	4 35
Extra Glasses....Each,	08	10	10	12	15	25

In ordering extra Glasses and Cork Washers for these cups, always specify number, as stamped on same.

"CODY" PATENT SHAFT OILERS.

LIST.

Numbers	1	2	3
Capacity....Ounces,	1	1⅝	2¾
Diameter....Inches,	1¾	2	2½
Height....Inches,	2⅝	3	3½
Finished, Brass....Each,	$0 50	0 55	0 60
Extra Glasses....Each,	08	08	08
Extra Cork Washers....Per dozen,	15	15	15

Shanks are threaded ⅜ inch on point, 16 threads to the inch.

THE ALTHOFF AUTOMATIC OIL CUPS

Have no equal for loose pulleys, engine crank pins, cross head and eccentrics. These cups are always adjusted, and need no attention except to fill them when empty.

POINTS OF SUPERIORITY, SIMPLICITY, STRENGTH AND DURABILITY.

No expensive repairs, as there is nothing to get out of order.

The face is mica, that any one can cut with ordinary shears should one get broken.

These cups will work only on revolving or back and forward motion.

Will use from 50 to 90 per cent. less oil than any other.

Any one can readily see that these cups cannot work unless machinery is running, no matter in what position they stop.

Pulley oil cups can be filled only one-half full, as filling hole is in center.

This is the only oil cup that has a record of two years' run on one filling.

In ordering cups give speed of pulley, size and face.

In ordering cups for engines give speed and horse-power, size of shank wanted, also number of threads per inch.

LIST.

Numbers.	Diameter. Inches.	Thickness. Inches.	Size of Shanks. Pipe Size. Inches.	Price for Engines, with Glass Faces, Nickel Plated.	Price for Loose Pulley, Nickel Plated.
1	1¼	1¼	⅛	$1 25	$1 00
2	2	1½	⅛ and ¼	2 00	1 25
3	2½	1⅝	¼ and ⅜	2 50	1 75
4	3⅜	2¼	⅜ and ½	3 25	2 25
5	4½	2¾	⅜ and ½	3 75	2 75
6	6	3¼	½ and ¾	5 00	3 50

Cut Full Size.

1895 BICYCLE CUP.

Bicycle Cups are all one size; shanks are $\frac{3}{16}$-inch diameter; 40 threads per inch. These cups are made with glass face; are automatic; will not oil unless wheels are in use; will run from three to six months with one filling; is air tight and dust proof; is indispensible on a bicycle; a trial will convince anyone.

To attach cups to bicycle wheels, tap out the regular oil holes in hubs; take cup, unscrew face, fill with oil, replace cap and screw up tight with pair of pliers (care must be taken not to lose small fiber washer on inside of glass); then screw into hub. Face of cup must be either to right or left of wheel (not crosswise.)

Loose Pulley Oilers are made out of spun brass, and therefore light; are automatic; will feed only when machinery is running; can be filled in any position; no screw to loosen or plugs to take out. A trial cup will convince any one that this is the only pulley oiler of any value. Engine, cranks, cross heads and eccentric cups speak for themselves. No starting and stopping required. Will take care of themselves if filled when empty. These cups are fitted with a feed tube that can be unscrewed and changed to a larger or smaller size as may be required. These cups cannot stop up from dirt or grit in oil, are light and ornamental.

Price.....$0 50

LOOSE PULLEY OILERS.

LUNKENHEIMER.

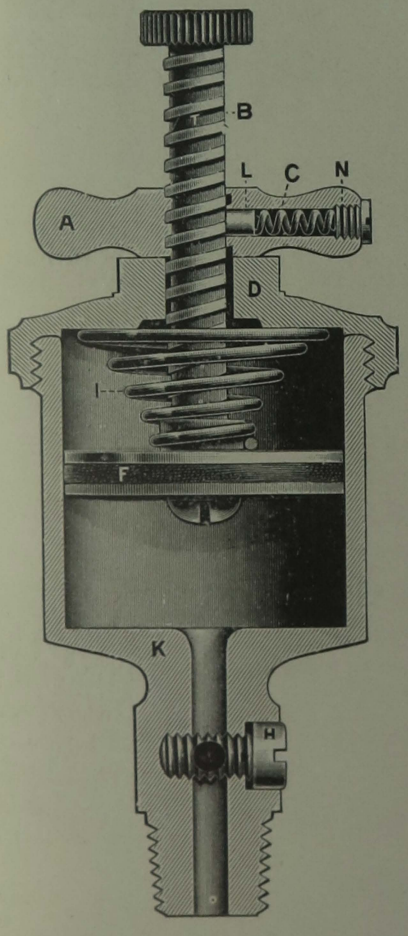
This Oiler must be attached to hub of pulley, is easily filled and regulated, will not throw or waste oil, and a trial will convince users that it is a simple and satisfactory oiler for loose pulleys.

LIST.

Numbers		0	1	2	3	4
Outside Diameter	Inches,	1	1¼	1½	1¾	2
Capacity	Ounces,	¼	½	¾	1¼	1¾
Rough, Brass	Each,	$0 25	0 30	0 40	0 50	0 65

Shanks on Nos. 0, 1 and 2 are threaded ⅜ inch on point, 16 threads to the inch.
Shanks on Nos. 3 and 4 are threaded ¼-inch pipe thread.

"IDEAL" AUTOMATIC GREASE CUPS.



The "Ideal" is provided with a leather packed plunger (insuring a tight joint and smooth working), which is so constructed that it is easily raised when cup requires recharging with grease. The spring and plunger are conveniently controlled by thumb-nut, which is provided with an automatic lock arrangement to prevent its jarring from position on stem. The hole through the shank can be regulated to suit the grease used, by means of regulating screw.

DIRECTIONS.

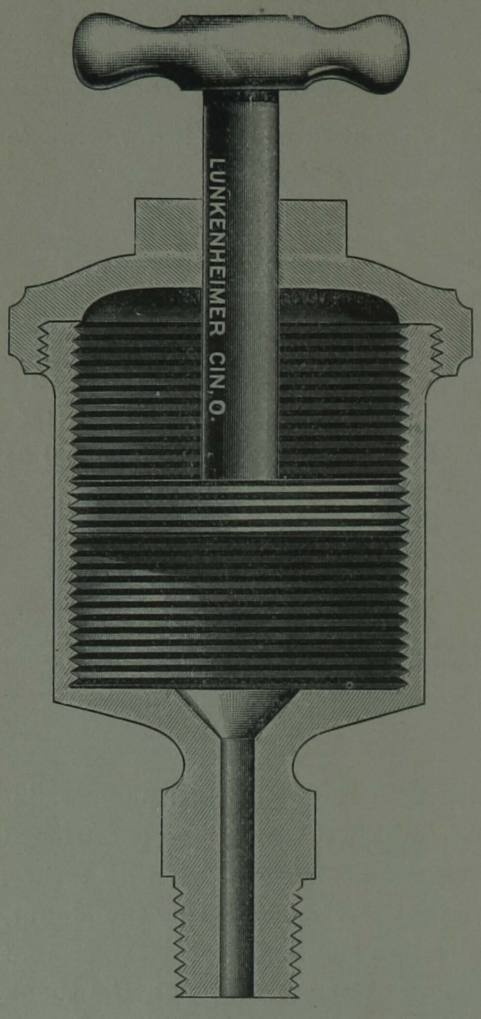
Turn thumb-nut (A) to the right until plunger is drawn to top of cup; then unscrew cover and fill the cup with grease. Replace cover and adjust pressure on grease by screwing up thumb-nut (A) to top of stem (T), thereby allowing plunger to compress and feed the grease.

The rate of feed must be regulated by set-screw (H), which has a hole through it in line with the slot; thus it is regulated like a stop cock.

If it is desired to stop the flow of grease, turn thumb-nut (A) down to cover, thereby taking tension off spring.

LIST.

Numbers		00	0	1	2	3	4
Inside Diameter	Inches,	1	1¼	1½	2	2½	3
Pipe Thread	Inches,	⅛	¼	¼	⅜	½	½
Capacity (Grease)	Ounces,	⅓	1	1½	3	4½	6½
Finished, Brass		$1 50	2 00	2 50	3 20	4 30	6 00
Nickel Plated		1 75	2 25	2 80	3 60	5 00	6 75

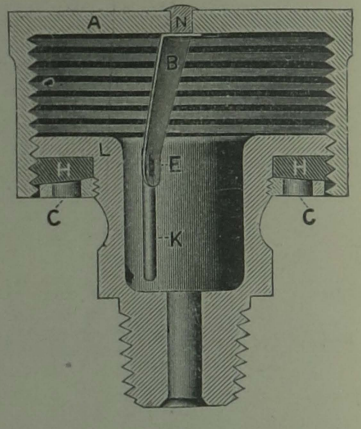


SCREW FEED "MARINE" GREASE CUPS.

This cup is more particularly designed for marine engines, but will also be found suitable for many other purposes where a screw feed is desired, or it is necessary to force the grease some distance to the parts to be lubricated.

LIST.

Numbers	00	0	1	2	3	4
Inside Diameter..Inches,	1	1¼	1½	2	2½	3
Shank.....Pipe Thread,	⅛	¼	¼	⅜	½	½
Capac'y (Grease) Ounces,	⅓	1	1½	3	4½	6½
Brass.....Each,	$1 00	1 20	1 60	2 00	2 80	4 00
Nickel Plated.....Each,	1 20	1 45	1 90	2 40	3 40	4 75



"TIGER" PLAIN BRASS GREASE CUPS.

The "Tiger" Plain Grease Cup is a cast brass cup, well adapted for jarring-machinery; is unsurpassed where a simple, compact and efficient plain cup is wanted. By screwing down cap (A) the lubricant is forced to the bearing. The leather washer (H) prevents the grease from leaking out of cup, and can be easily replaced when worn out; spring lock arrangement (B) the projection (E) of which engages (K) at each turn, prevents the cap from jarring off, also cuts and loosens the grease.

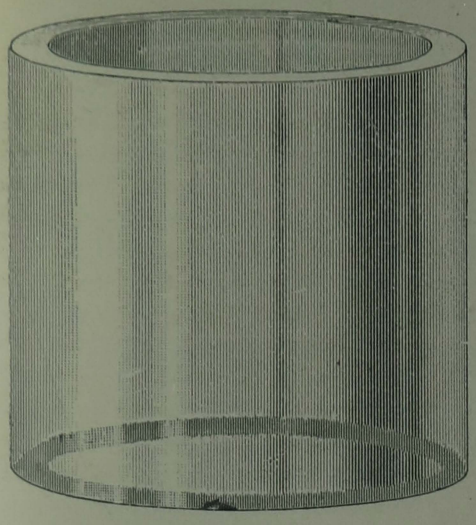
Always keep leather washer (H) well expanded against the thread by screwing up plate (C). This plate can easily be tightened or unscrewed by using a pointed tool, inserting it in one of the holes in plate and striking it with a hammer.

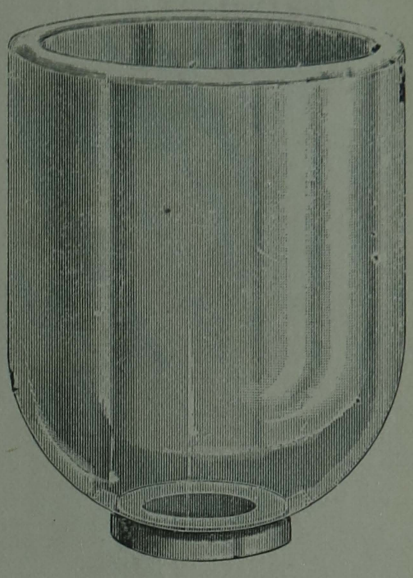
These cups are furnished in three styles, viz: Finished Brass, Nickel Plated, and Rough—(see list below).

When no style is mentioned, orders will be filled with finished brass, same as shown in cut.

LIST.

Numbers	00	0	1	2	3	4
Inside Diameter.....Inches,	1	1¼	1½	2	2½	3
Pipe Thread.....Inches,	⅛	¼	¼	⅜	½	½
Capacity, Grease .....Ounces,	¼	⅔	1	2	3½	5
Finished, Brass .....Each,	$ 0 70	90	1 15	1 50	2 15	2 90
Finished, Nickeled.....Each,	82	1 06	1 36	1 80	2 60	3 40
Rough.....Each,	56	74	96	1 28	1 76	2 30

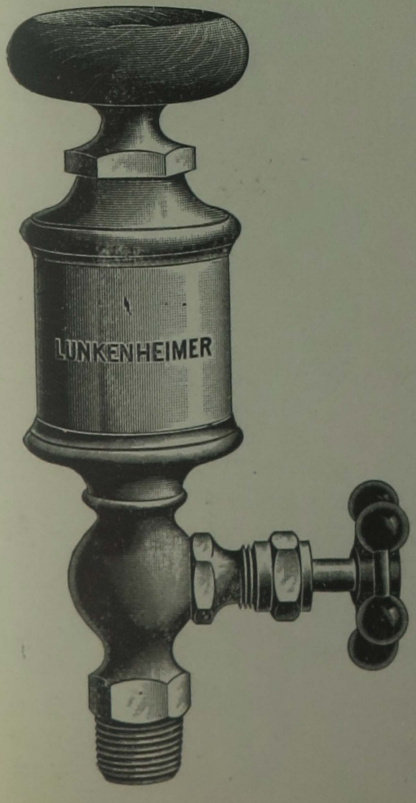




CYLINDER AND URN-SHAPED GLASSES.

LIST.

Numbers	000	00	0	1	1½	2	3	4	5	6
O. D. of Cylinder and Urn-shape Glasses ...Inches	1	1⅛	1¼	1½	1¾	2	2¼	2½	3	3½
Height of Cylindrical Gl's. Inches	⅞	1	1⅛	1⅜	1⅝	1⅞	2⅛	2⅜	3	4
Price .....Each	$0 05	0 06	0 08	0 10	0 10	0 12	0 15	0 25	0 35	0 65
Cork Washers .....Per dozen	15	18	24	30	36	40	45	50	60	75



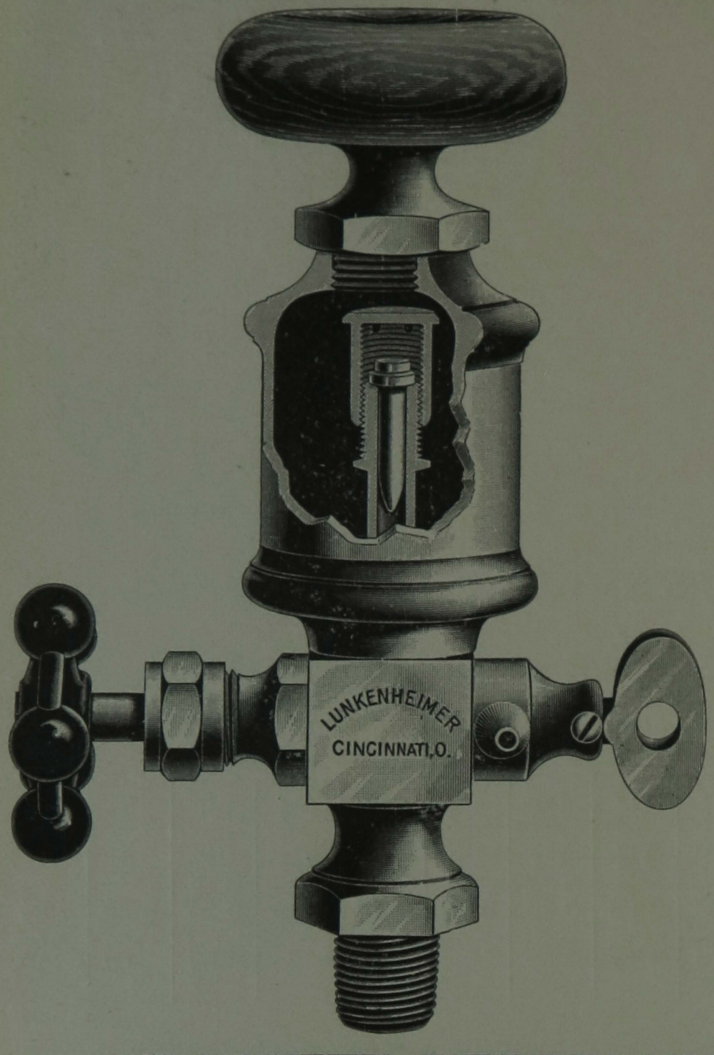
PLAIN CYLINDER LUBRICATORS.

LIST

Numbers	00	0	1	2	3
Diameter .....Inches	1	1¼	1½	1¾	2
Pipe Thread.....Inches	⅜	⅜	⅜	½	½
Plain .....Each	$2 00	2 20	2 40	2 60	2 90
Plain, with Cock and Tube. Each	3 00	3 20	3 40	3 60	3 90

Numbers	4	5	6	7	8
Diameter.....Inches	2¼	2½	3	3½	4
Pipe Thread .....Inches	½	½	¾	¾	¾
Plain.....Each	$3 25	3 75	4 75	7 00	10 00
Plain, with Cock and Tube. Each	4 25	4 75	5 75	8 00	11 00

AUTOMATIC NEEDLE VALVE OIL FEEDERS.



LUNKENHEIMER.

Is intended for *slide valve* engines only, works automatically by pulsation, and must be placed on the steam chest. The stop valve must always be left open except when filling cup with oil. Do not drain off the water until ready to recharge the cup. The lubricator stops feeding when the engine stops, and is about properly adjusted as shipped. To regulate the feed, screw yoke up or down, thereby increasing or decreasing the lift of needle. The greater the lift of the needle the more oil is fed; the needle works up and down like a check valve while the engine is in motion.

LIST.

Diameter.....Inches	1¾	2	2½	3
Capacity.....Pint	¼	½	¾	1
Shank, pipe thread. In.	⅜	½	½	¾
Plain Top.....Each	4 70	6 20	7 70	9 00
Cross Top, with glass gauge.....Each	....	....	11 30	14 50

A card with full directions for using the Oil Feeder is attached to every cup.

GRAPHITE LUBRICATORS

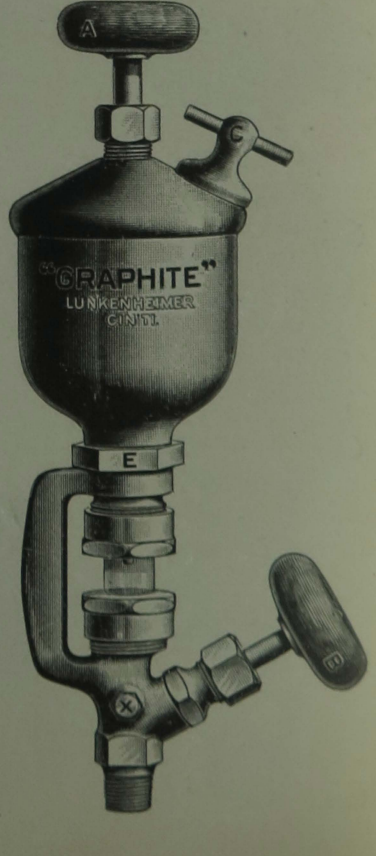
Should always be placed on the steam chest. On side valve engines it is only necessary to use one cup, placing it about the middle of the steam chest, but on Corliss engines it is best to use two, placing one over each valve.

DESCRIPTION.

A—Graphite regulating valve.
B—Steam valve.
C—Filling plug.
E—Nut for taking cup apart.
X—Drain plug.

DIRECTIONS FOR OPERATING.

Close steam valve B and open drain plug X to allow steam to escape from cup; then close regulating valve A, remove filling plug C, and fill cup with graphite. After replacing filling plug C, close drain plug X; open steam valve B (wide) and regulate feed of graphite by regulating valve A. The sight-feed glass can easily been cleaned by opening drain plug X. If necessary to replace the sight-feed glass take cup apart at E by means of wrench furnished, and slide the new glass down through the opening. As graphite is a very superior lubricant, and a small quantity will last quite a while, it is recommended to be used very economically, as a continuous feeding of same is not necessary; thus the feed can occasionally be shut off.



LIST.

Numbers	1	2	3
Capacity (Graphite).....Ounces	3	5	8
Shank.....Pipe Thread	¼	⅜	½
Finished, Brass.....Each	$10 00	$12 00	$16 00
Finished, Brass, Nickel Plated.....Each	11 00	14 00	18 00

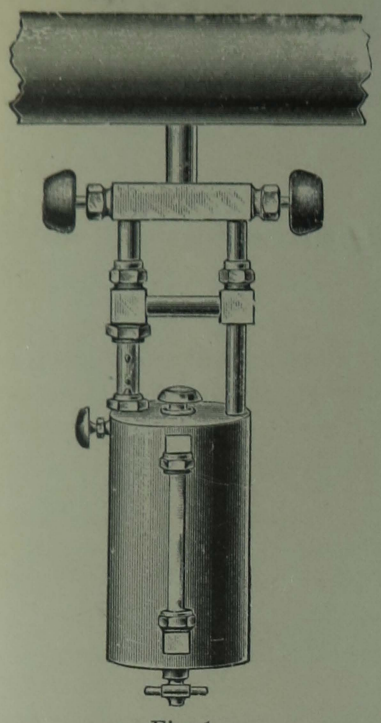


Fig. 1.
For attaching to Underside of Horizontal Pipe.

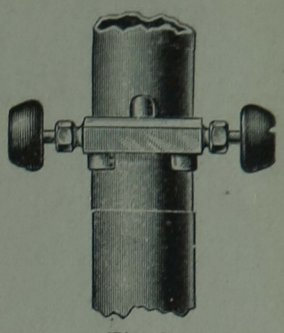


Fig. 2.
For Side of Upright Pipe.

NEVER-FAIL BOILER OIL FEEDERS.

FEEDS KEROSENE, CRUDE OR BOILER OIL BY THE DROP.

The construction of the Never-Fail Boiler Oil Feeder is such, that there are distinctly separate passages for the oil and water in both the double and single connections, consequently the feeder never fails to work. The sight-feed being on top of the cup it can be seen from a great distance and from any direction.

We show cuts of two different connections. Fig. 1 as shown on the cup is recommended when it is desirable to set the oil feeder down within convenient reach and attach to horizontal pipe some considerable distance above, otherwise Fig. 2 is more easily attached and just as reliable. When a heater is used the oil feeder should be placed between the heater and the boiler. In all cases attach as near the under sider of pipe as possible when placed on horizontal pipe so as to give the oil as much of an upward flow as possible.

Attach boiler oil feeder directly into the feed water pipe, between heater and boiler. See that the small bent tube is screwed into the end of connection on the water side, and turned so that the water from pump will flow into it.

37½ It requires 37½ times as much fuel to heat a given quantity of water to a certain temperature through a ¼-inch scale as is necessary to heat it only through iron or steel. Think of it—a loss of money, power, time and patience.

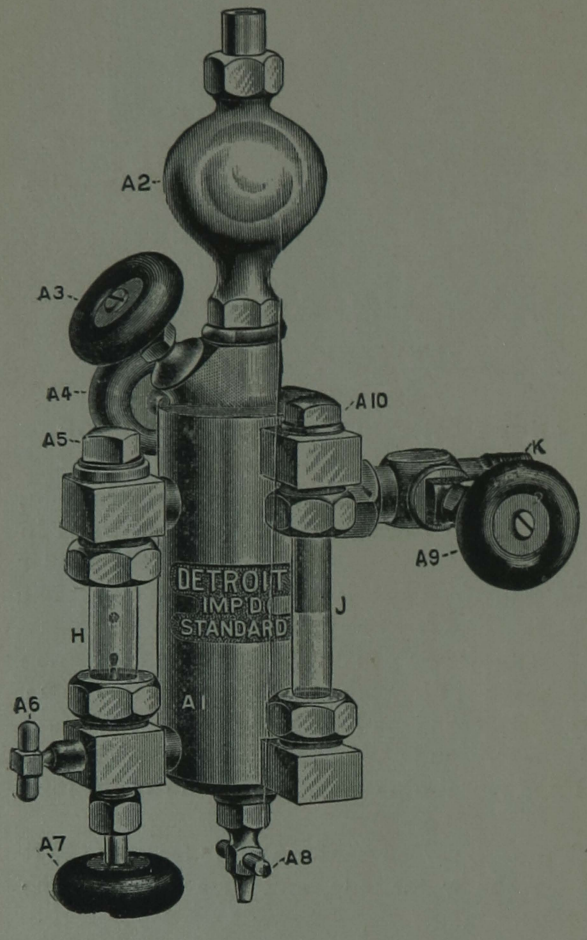
Oil has been considered the safest and most effectual agent for removing scale and preventing its formation, but hitherto could not be furnished in sufficiently small quantities to insure safety to the boiler and accomplish the desired purpose. Injections by the gallon or bucketful are injurious and practically worthless. Oil, when fed by the drop, will remove all existing scale and prevent further formations, without doing any damage. It would be a mistake to take as much medicine in one dose as should have been taken in 30 days. It is just as much a mistake to dose your boiler with as much oil when you clean out as should be fed in drops at a time for 30 days.

The Never-Fail Boiler Oil Feeder can be connected to any boiler, requires no attention and a *pint* of oil injected each day *by the drop* accomplishes more work than three gallons injected at one time. Oil clings to iron or steel wherever it touches, and spreads over it in spite of everything, lifting any and all substances away from the body over which it is spreading, and with a *steady and continuous addition* of the oil it will cover the entire surface of the metal and clear it from all foreign substances.

LIST.

	Brass.	Nickel Plated.
One Pint	$30 00	$35 00
One Quart	45 00	50 00
Half Gallon	60 00	65 00

THE "DETROIT" IMPROVED STANDARD STATIONARY ENGINE LUBRICATORS.



Embraces the following important improvements:

1st. The oil is poured directly into the top of the body, in pint and larger sizes.

2d. Has a drain valve at bottom of the sight-feed glass which enables the engineer to blow steam through and thoroughly cleanse the glass.

3d. The sight-feed and gauge glasses are inserted through the upper arms.

4th. The sight-feed glass, and the valve regulating the feed, are on the opposite side from the steam pipe.

5th. The internal construction is such that no heater is required for feeding heavy oils, tallow or beeswax.

6th. The sight-feed glasses are always clean and clear.

7th. The support for connecting to the steam pipe is placed on the back of the lubricator. This support is in two parts, greatly facilitating the attachment, as the part containing the globe valve is first screwed into the steam pipe, after which the lubricator may be coupled to it.

One-third and one-half pint sizes are filled through gauge glass.

DESCRIPTION.

A 1, Body or Oil Reservoir.
A 2, Condenser.
A 3, Filler Plug.
A 4, Water Feed Valve Stem.
A 5, Plug for inserting Sight-Feed Glass.
A 6, Sight-Feed Glass Drain Stem.
A 7, Sight-Feed Regulating Valve Stem.
A 8, Drain Valve.
A, 9, Globe Valve in Support Arm.
A 10, Plug for inserting Gauge Glass.
H, Sight-Feed Glass.
J, Gauge Glass.
K, Connection to Steam Pipe.

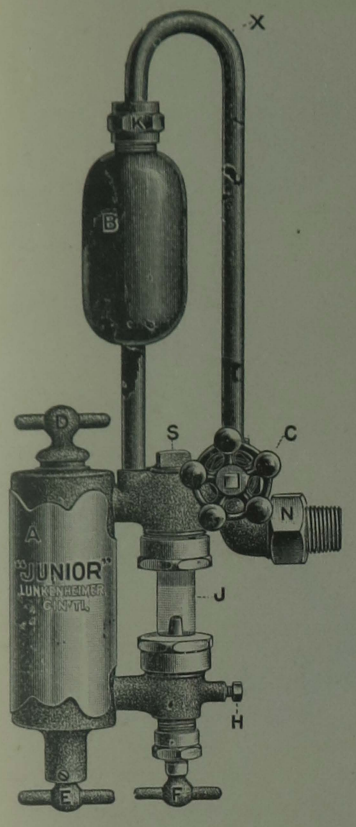
Valve in Support Arm should be in horizontal position as shown in cut when Lubricator is attached to steam pipe.

LIST.

Capacity.	Suitable for Engine with Diameter of Cylinder as Follows:	Plain Brass.	Nickel Plated.
One-third Pint	Up to 8 inches	$17 00	$20 00
Half Pint	8 to 10 inches	22 00	25 00
Pint	10 to 18 inches	30 00	35 00
Quart	18 to 30 inches	45 00	50 00
Half Gallon	30 inches and over	60 00	65 00
Gallon		75 00	80 00

JUNIOR
SINGLE CONNECTION SIGHT-FEED LUBRICATORS.

LUNKENHEIMER.



To Fill and Operate.—Close valves C and F, drain cup at E, and fill (full) with oil. Then open valve C slowly. When glass tube has filled with water, regulate oil drops at F.

While cup is working leave steam valve C wide open, unless pulsation interferes with oil drops, in which case regulate to suit. Valve H should only be opened when it becomes necessary to blow out or drain sight-feed glass.

LIST.

Size ..... Pints	¼	⅓	½	⅔	1
Shank.....Pipe Thread	⅜	⅜	½	½	½
Partly Finished.....Each	$ 7 00	8 00	10 00	13 00	14 00
All Finished, (Brass Condensers and Pipes, with Wood Handles)..Each	8 50	10 00	12 00	15 00	16 00
All Finished and Nickel Plated. (Brass Condensers and Pipes).Each	10 00	11 50	13 50	17 00	18 00

One-quarter and one-third pint sizes are also made with ½-inch pipe shank, but will be sent as above (⅜-inch) unless specially ordered.

Note.—These Lubricators are also furnished with glass gauge, to indicate quantity of oil in reservoir, at an extra charge of 50 cents net, each, but will be sent without, unless specially ordered.

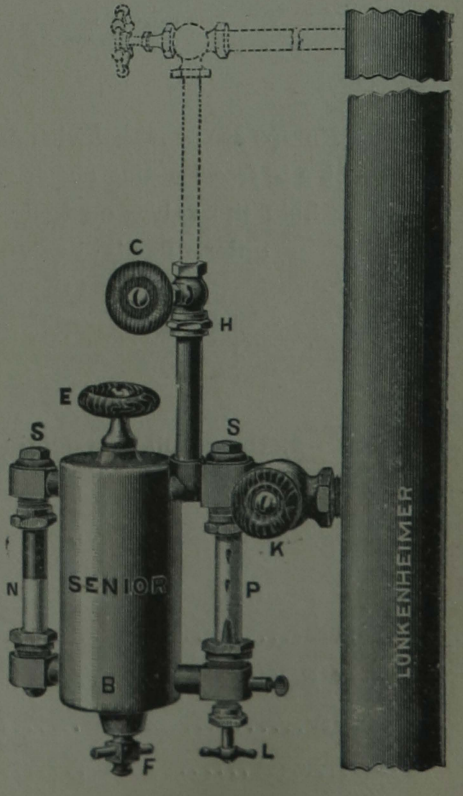
IMPROVED
"SENIOR" SIGHT-FEED LUBRICATORS.

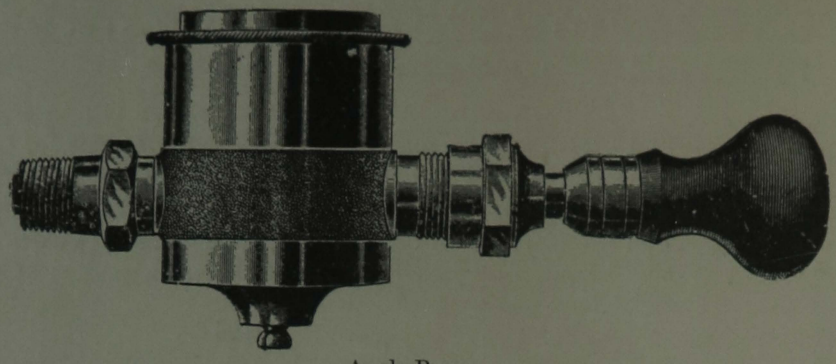
LUNKENHEIMER.

LIST.

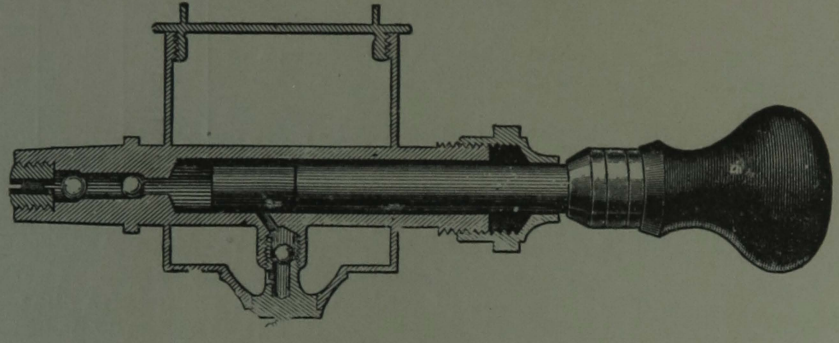
Size.....	⅓ Pt.	½ Pt.	⅔ Pt.	1 Pt.	1½ Pt.	1 Qt.	½ Gal.	1 Gal.
Suitable for Engine Cylinders.....	Up to 6 Inches.	6 to 10 Inch's	10 to 14 Inch's	14 to 18 Inch's	18 to 24 Inch's	24 to 30 Inch's	From 30 up.	.....
Shanks, Threaded ..... Pipe Thread	⅜	⅜	½	½	½	½	½	½
Finished, Brass. Each	$15 00	17 00	20 00	22 00	25 00	28 00	38 00	60 00
Nickel Plated...Each	17 00	19 00	22 50	25 00	28 50	32 00	43 00	65 00
Condenser Connections, Brass Tubing and Angle Valve, ...Each	70	80	1 00	1 20	1 40	1 50	1 60	1 70
Condenser Connections, Brass Tubing and Angle Valve, Nickel Plated. Each	80	90	1 15	1 40	1 60	1 70	1 80	2 00
Length of Cond. Pipes necessary... Inches	18	24	30	36	42	48	60	72

Lubricators are sent without Condenser Pipes and Angle Valves, unless otherwise ordered.





Angle Pump.



Sectional View of Horizontal Pump.

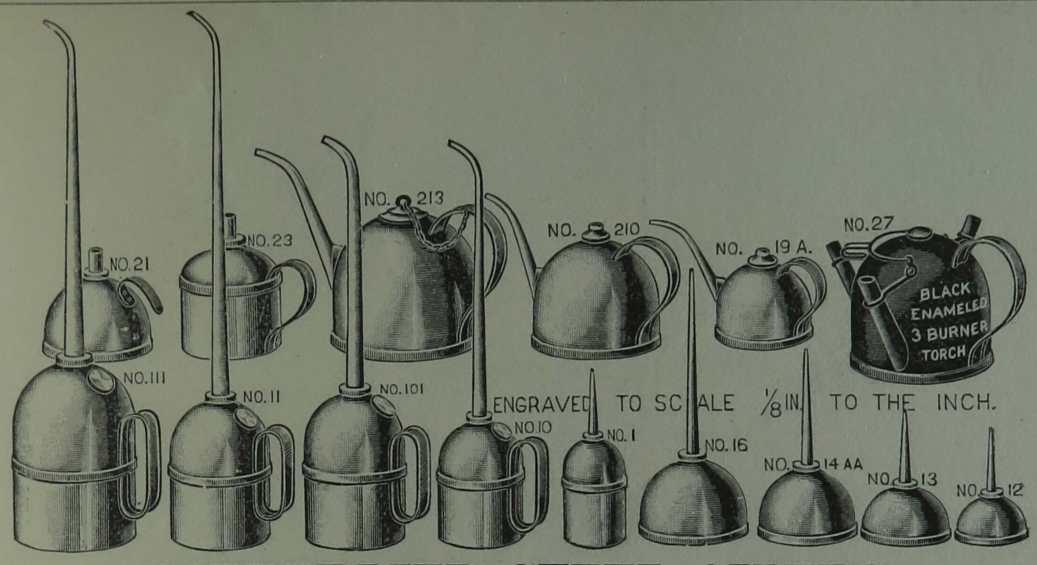
HAND CYLINDER OIL PUMPS.

These Pumps are provided with *hardened steel ball valves*, which are well known to be the most perfect and freest acting check valve known to the mechanical world. They have no springs to hold the valves on their seats, as pumps with springs are continually getting out of order. The ball valves are constantly turning by use, thus presenting a clean surface on the seats at each stroke of the pump, keeping the valve and seat free from gum and dirt.

Better results are obtained if Globe Valve is used in connection with these Pumps.

LIST.

Numbers	1	2	3	4	5
Size of Bowl	2¼x2¼	2½x2½	2¾x2¾	3½x3½	4x5
Capacity	¼ Pint.	⅓ Pint.	½ Pint.	1 Pint.	1 Quart.
Price.....Each,	$3 50	4 25	5 00	7 50	12 00



COPPERIZED STEEL OILERS.

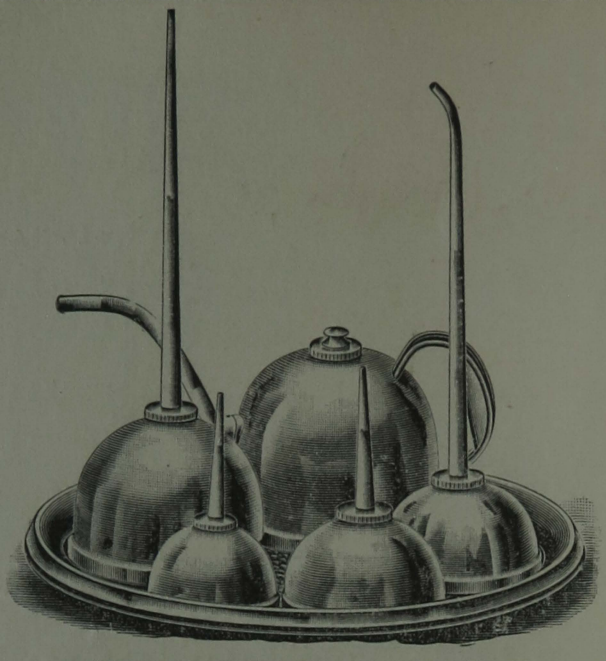
Seamless C. R. Swedoh. Anti-Rust.

LAMPS, FILLERS, TALLOW POTS, TORCHES, ENGINEERS AND STEAMBOAT SETS.

LIST.

	Numbers. Copperized.	Dome Diameter Inches.	Nozzle Length. Inches.	Price, per Dozen.	Numbers. Nickel Plated.	Price, per Dozen.
SPRING BOTTOM OILERS.	12*	2¾	2½	$ 4 50	120	$ 6 50
	13*	3⅜	3	5 50	130	8 00
	13A	3⅜	5	6 00	130A	8 75
	14	3⅜	9	6 50	140	9 20
	14A	3¾	3	7 50	140A	10 00
	14AA*	3¾	5	8 00	140AA	10 75
	14B	3¾	9	8 50	140B	11 25
	15	4⅛	3	9 25	150	12 00
	15A	4⅛	5	9 75	150A	13 00
	16*	4⅛	9	10 50	160	14 00
			3, 5, 9, 12 and 18 in. Interchangeable.			
RAILROAD OILERS.	10*	3⅜	12	14 00	17	18 00
	11*	4⅛	18	18 00	18	21 00
	101*	4⅛	10	18 00	Holds 1 Quart.	
	111*	5	14	20 00	Holds 2 Quarts.	
SIPHON OR MILL OILERS.				Gross.		
	1	2½	3	48 00	Body 4½ inches high.	
	2	2¾	5	52 00	Body 5 inches high.	

	Numbers. Copperized.	Dome Diameter Inches.	Capacity.	Price, per Dozen.	Numbers. Nickel Plated.	Price, per Dozen.
ENGINEERS FILLERS.	19	4⅛	1 pint	$14 00	....	....
	19A*	4¾	1½ pints	17 00	190	$22 00
	210*	5	1 quart	20 00	200	30 00
	211	6	2 quarts	24 00	201	34 00
LAMPS. ONE BURNER.	20	3⅜	½ pint	6 00	20N	$ 8 50
	20½	3¾	¾ pint	9 00	20½N	11 50
	21*	4⅛	1 pint	12 00	21N	14 50
	22	3¼	1 pint	9 00	220	12 00
	23*	4	1½ pints	12 00	230	15 00
TALLOW POTS.	212	6	1 quart	21 00	214	32 00
	213*	5	2 quarts	25 00	215	36 00



ENGINEER'S SETS.

SINGLE BOTTOM TRAYS.

These goods are all heavily electro-copper plated inside to prevent rusting and the oil from becoming gritty. The outside of the copperized oilers perfectly resembles burnished copper.

LIST.

Numbers. Copperized.	Number of Pieces in Set.	Tray Diameter and Kind. Inches.	Price Per Set.	Numbers. Nickel Plated.	Price per Set.
30	5	12 round	$ 5 00	50	$ 7 00
40	6	14 round	7 00	60*	10 00
35	5	14 oval	7 00	55	8 00
45	6	16 oval	10 00	65	11 00

GREASES AND OILS.

GREASES.

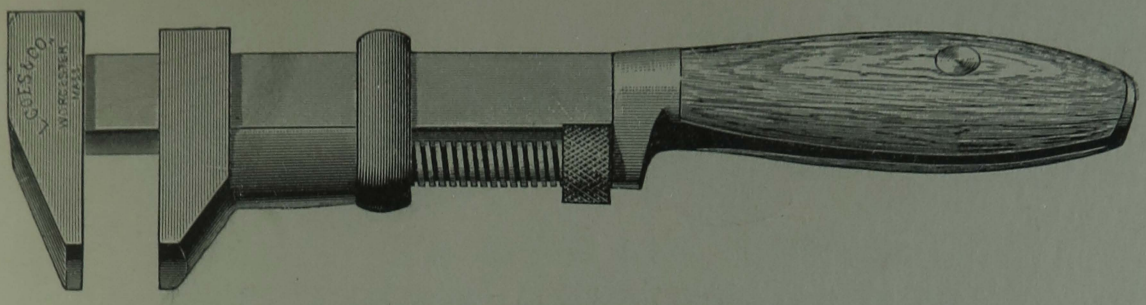
LIST.

	Kegs. Per Pound.	½ Barrels. Per Pound.	Barrels. Per Pound.
Albany Compound			
RM Crank Pin Grease			
KB Lubricant			
KB Pipe Joint Grease			
KB Rope Grease			
KB Rope Compound			
Slag Pot Grease			

OILS.

LIST.

	Barrels. Per Gallon.		Barrels. Per Gallon.
KB Cylinder		D Engine	
KB AA Cylinder		Light Machine	
KB Red A Cylinder		Light Machine—Castor	
KB D Cylinder		Heavy Machine—Castor	
KB Dynamo		Golden Machinery	
KB Ammonia Machinery		Extra Dark Lubricating	
KB A Drill		Summer Test	
KB D Drill		15 Degree Test	
AA Engine		Zero Test	
A Engine		A White Miners' Oil	
C Engine		B White Miners' Oil	



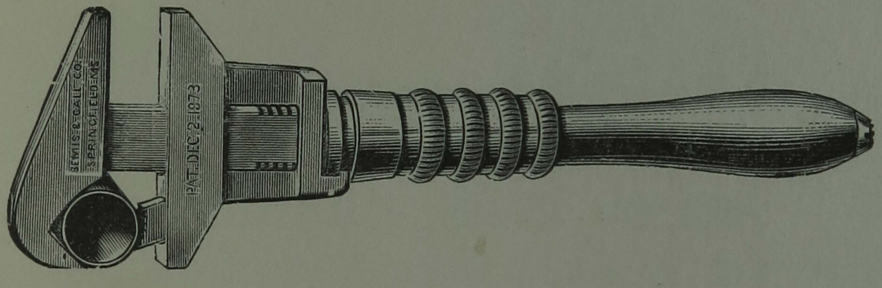
COE'S WRENCHES.

LIST.

Size.....Inches,	6	8	10	12	15	18	21
Black.....Per dozen,	$ 9 00	10 00	12 00	14 00	24 00	30 00	36 00
Polished.....Per dozen,	10 00	11 00	14 00	16 00	26 00	32 00	38 00

AGRICULTURAL WRENCHES.

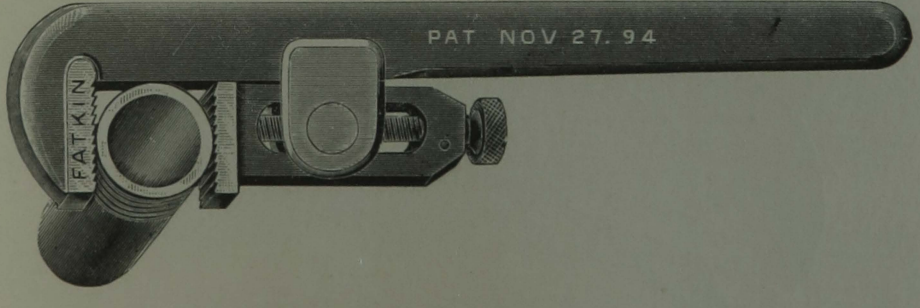
LIST SAME AS ABOVE.



"B AND C" COMBINATION WRENCHES.

LIST.

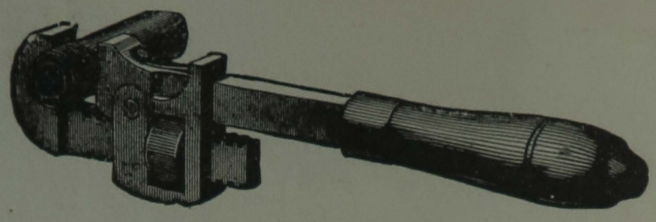
Size—Inches.		Short Nut.	Long Nut.	Extra Grips.
10	Bright Finish, takes pipe from ½ to 1 inch.....Per dozen,	$23 00	25 25	Each, 0 25
12	Bright Finish, takes pipe from ½ to 1½ inch.....Per dozen,	26 00	28 50	Each, 30
15	Bright Finish, takes pipe from ½ to 2 inch.....Per dozen,	37 00	40 50	Each, 35



FATKIN PIPE WRENCHES.

LIST.

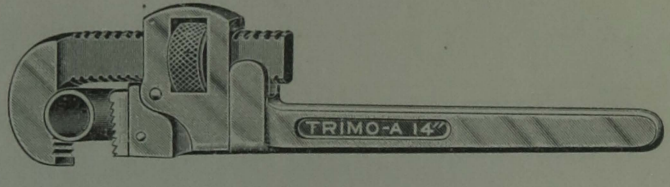
Length, open.....Inches,	8	10	14	18	24	36	48
Takes from.....Inches,	⅛ to ¾	⅛ to 1	⅜ to 1½	½ to 2	¾ to 2½	1 to 3½	1 to 5
Price.....Each,	$2 00	2 50	3 00	4 00	6 00	12 00	18 00



STILLSON'S PIPE WRENCHES.

LIST.

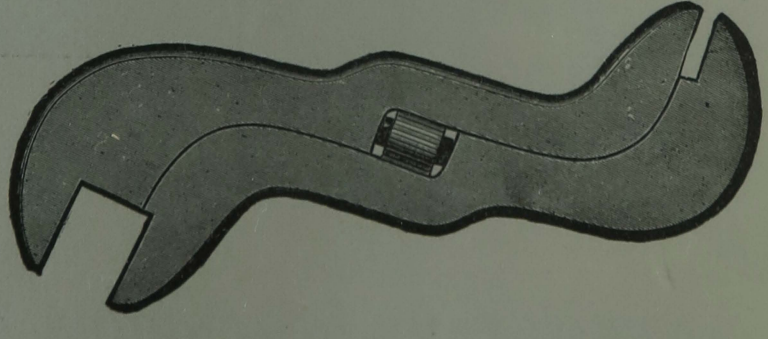
Length, open.....Inches	6	8	10	14	18	24	36	48
Takes Pipe from.....Inches	⅛ to ½	⅛ to ¾	⅛ to 1	¼ to 1½	¼ to 2	¼ to 2½	¼ to 3½	1 to 5
Price.....Each	$2 00	$2 00	$2 25	$3 00	$4 00	$6 00	$12 00	$18 00
Jaws.....Each	67	67	75	1 00	1 33	2 00	4 00	6 00
Frames.....Each	25	25	33	45	55	65	75	1 00
Nuts.....Each	20	20	27	35	42	50	65	80
Handles.....Each	15	15	20	25	30	....	....	....



TRIMO PIPE WRENCHES.

LIST.

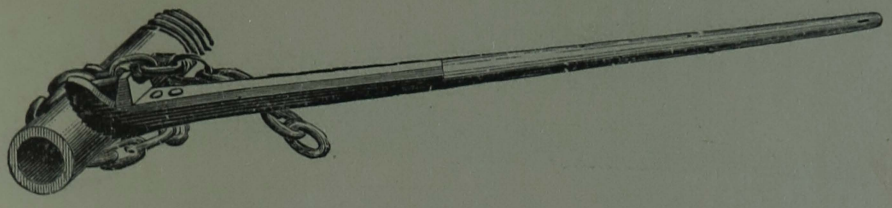
Length, open.....Inches	6	8	10	14	18	24	36	48
Takes Pipe from.....Inches	⅛ to ½	⅛ to ¾	⅛ to 1	¼ to 1½	¼ to 2	¼ to 2½	½ to 3½	1 to 5
Price.....Each	$2 00	$2 00	$2 25	$3 00	$4 00	$6 00	$12 00	$18 00
Jaws.....Each	67	67	75	1 00	1 33	2 00	4 00	6 00
Nuts.....Each	20	20	27	35	42	50	65	80
Inserted Jaws.....Each	25	25	33	50	55	65	1 00	1 25
Frames.....Each	25	25	33	45	55	65	75	1 00



ADJUSTABLE "S" WRENCHES.

LIST.

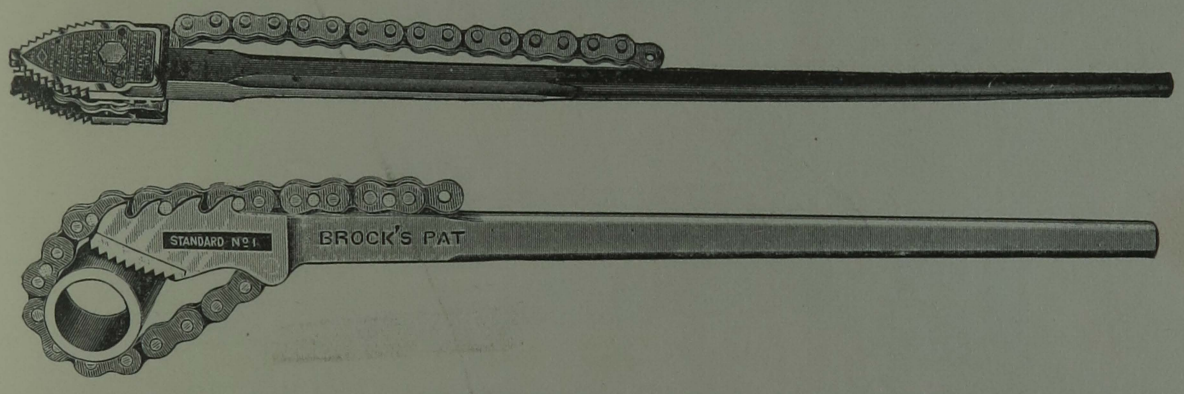
Size.....Inches,	4	6	8	10	12
Price.....Each,	$0 50	0 75	1 00	1 50	2 00



ROBBIN'S CHAIN TONGS.

LIST.

Numbers	2	3	4	5	6	7
Length of Lever.....Feet,	2¾	3	4	5	6	7
Diameter of Chain (Link).....Inches,	5/16	5/16	3/8	7/16	½	¾
Takes Pipe from.....Inches,	1 to 2	1¼ to 4	2 to 6	2½ to 8	4 to 10	6 to 12
Price.....Each,	$5 50	6 25	9 00	12 50	16 00	30 00



BROCK'S DROP FORGED CHAIN PIPE TONGS.

LIST.

Numbers	0	1	2	3	3½	4	5
Price.....Each,	$2 50	3 50	5 50	7 50	9 00	11 00	18 00
Capacity.....Inches,	⅛ to ¾	¼ to 1½	¼ to 2½	¾ to 4	1 to 6	1½ to 8	2 to 14
Length..... Inches,	12½	20	27	37	44	50	64
Extra Chains.....Each,	$0 75	1 00	2 00	3 00	3 50	4 00	6 00
Extra Shoes.....Each,	1 00	87	1 37	2 00	2 25	2 50	3 00

CHAMPION CHAIN PIPE WRENCH.

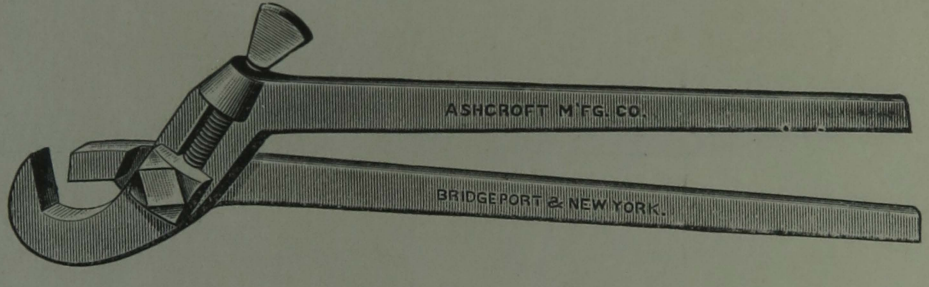
LIST.

Numbers	0	1	2	3	4
Capacity..... Inches,	⅛ to 1	¼ to 2	¼ to 3	¾ to 6	1½ to 10
Length.....Inches,	12½	19½	28	38¼	50½
Weight.....Pounds,	1¼	4¼	8	15	28
Price.....Each,	$2 50	3 50	5 50	7 50	11 00
Extra Chains.....Each,	0 75	1 00	1 50	2 50	4 00
Extra Jaws, ...Pair,	1 00	1 75	2 75	4 00	5 50

PIPE TONGS.

LIST.

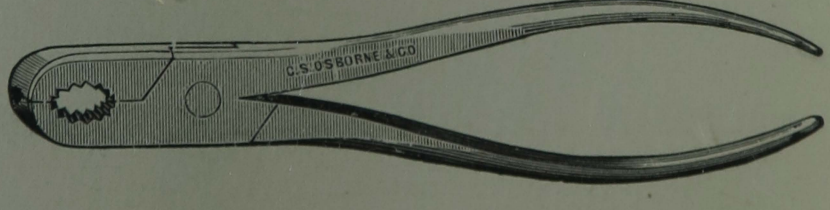
Size..Inches,	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6
Price...Each,	$0 60	0 65	0 70	0 75	0 90	1 10	1 30	1 50	1 90	2 50	4 25	5 25	6 25	9 00	11 00



BROWN'S PIPE TONGS.

LIST.

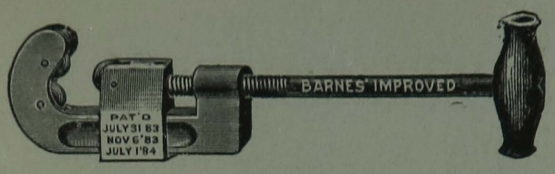
Numbers.....	1	1½	2	3	4	5	6	7
Takes Pipe from..... ..Inches,	⅛ to ¾	⅜ to 1	½ to 1¼	1 to 2	1½ to 3	2½ to 4	3 to 5	4 to 7
Price.....Each,	$1 30	1 65	2 00	3 00	6 00	11 00	25 00	35 00



GAS PLIERS.

LIST.

Size.....Inches,	5	6	7	8	9	10	12	14	16
Price.....Each,	$0 50	0 70	0 75	0 80	0 85	0 90	1 10	1 50	2 00



BARNES' THREE-WHEEL PIPE CUTTERS.

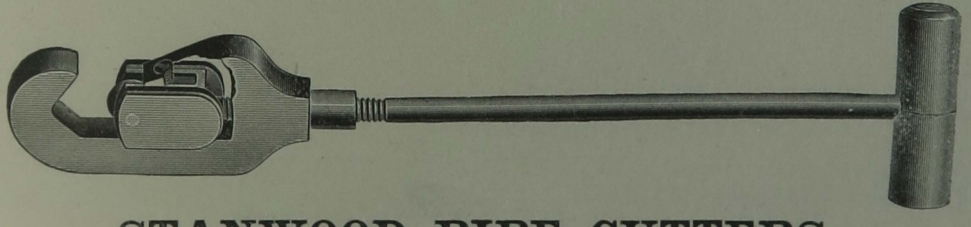
LIST.

Numbers	1	2	3	4	5	6	7
Cuts Pipe.....Inches,	⅛ to 1	½ to 2	1½ to 3	2½ to 4	4 to 6	6 to 8	9 to 12
Price .....Each,	$4 50	6 00	10 00	20 00	30 00	40 00	50 00
Extra Cutter Wheels...Each,	25	30	40	50	75	75	75
Extra Wheel Pins.....Each,	10	10	12	15	20	25	25

SAUNDERS' PIPE CUTTERS.

LIST.

Numbers	1	2	3
Cuts Pipe.....Inches,	⅛ to 1	1 to 2	2 to 3
Price.....Each,	$3 00	4 50	14 00
Extra Wheels.....Each,	24	32	60
Extra Blocks and Wheels .....Each,	1 25	1 75	3 25
Extra Pins.....Each,	10	10	15
Extra Rollers.....Each,	24	32	50



STANWOOD PIPE CUTTERS.

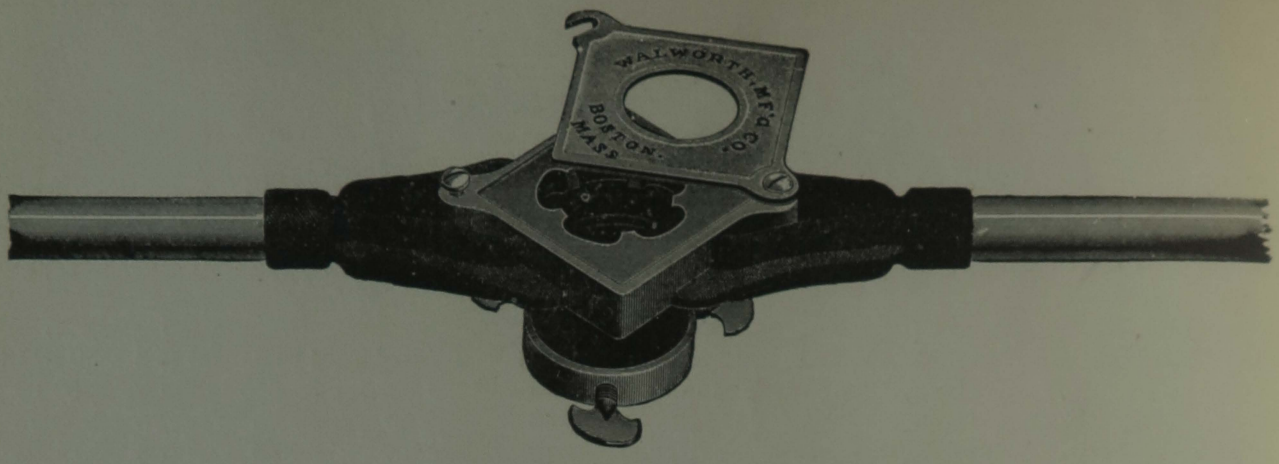
LIST.

Numbers	1	2	3
Cuts Pipe .....Inches,	⅛ to 1	¾ to 2	2 to 3
Price.....Each,	$1 50	2 25	7 00
Cutter Wheels.....Each,	12	18	25
Cutter Blocks and Wheels .....Each,	45	60	1 25
Pins.....Each,	05	05	08

WALWORTH'S PIPE CUTTERS.

LIST.

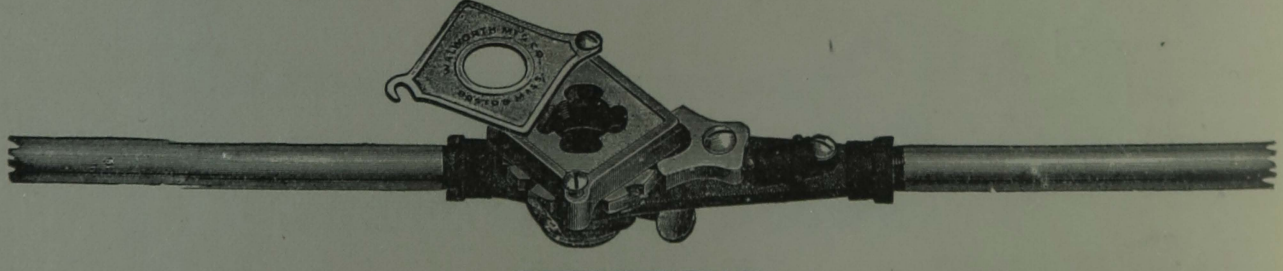
Numbers	1	2	3
Cuts Pipe.....Inches,	⅛ to 1	¾ to 2	2 to 3
Price.....Each,	$1 50	2 25	7 00
Cutter Wheels.....Each,	12	18	25
Cutter Blocks and Wheels.....Each,	60	90	1 50



STOCKS AND DIES.

LIST.

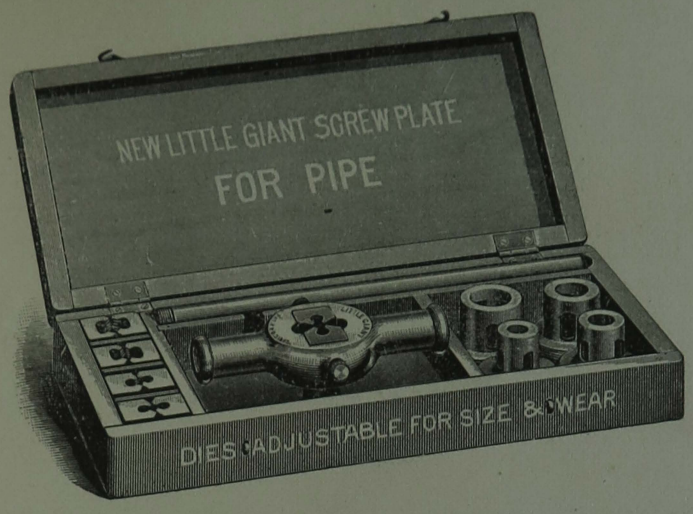
Numbers.	Threads. Inches.	Dimensions of Dies. Inches.	Die Plates Complete.	Without Dies.	Extra Dies.	Extra Bushings.	Extra Die Frames.
0	⅛ to ½	2 x 2 x ½	$ 9 50	$ 3 50	$ 1 50	$ 25	.....
1	¼ to 1	2½ x 2½ x ¾	15 00	5 00	2 00	35	$ 0 30
1½	¾ to 1¼	3 x 3 x ¾	13 50	6 00	2 50	45	40
1¾	1 to 1½	3 x 3 x ¾	13 50	6 00	2 50	45	40
2	1¼, 1½ and 2	4 x 4 x ⅞	20 00	9 50	3 50	60	50
3	2½ and 3	5 x 5 x 1¼	43 00	25 00	9 00	1 00	60
4	2½ and 3	5 x 5 x 1¼	51 00	33 00	9 00	1 00	60



MILLER'S
REVERSIBLE RATCHET STOCKS AND DIES.

LIST.

Numbers.	Threads. Inches.	Dimensions of Dies. Inches.	Die Plates Complete.	Without Dies.	Extra Dies.	Extra Bushings.	Extra Die Frames.
A	⅛ to ¾	2 x 2 x ½	$13 00	$ 7 50	$ 1 10	$ 0 20	.....
B	¼ to 1	2½ x 2½ x ¾	15 00	8 50	1 50	25	$ 0 22
C	1 to 1½	3 x 3 x ¾	18 50	13 00	1 80	35	30
D	1¼ to 2	4 x 4 x ⅞	20 00	13 50	2 50	45	38
E	2½ and 3	5 x 5 x 1¼	43 00	29 00	7 00	75	45



LITTLE GIANT SCREW PLATES.

FOR PIPE.

A Solid Die, yet Adjustable.

The introduction of the New Little Giant Patent Adjustable Die for bolts has been so satisfactory that we have adapted its use for pipe.

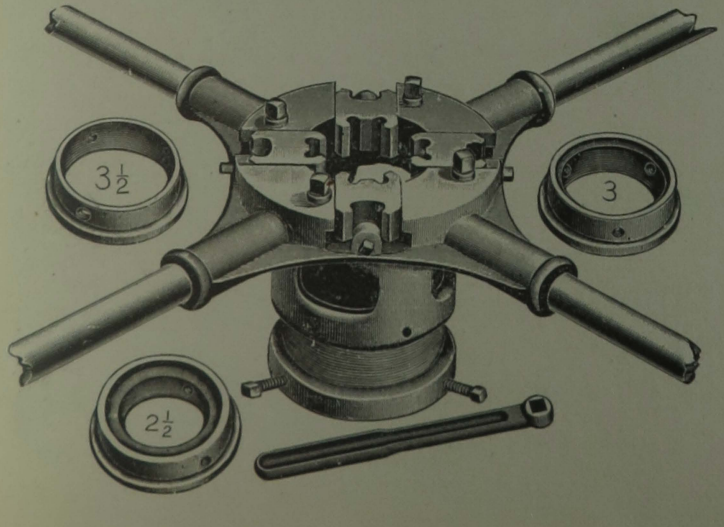
The guides are interchangeable throughout the set, for convenience in cutting nipples.
Sure to cut the thread straight.
The dies can be re-sharpened.
Dies are adjustable to overcome variation of fittings or pipe.
Dies and guides can be changed quickly.
It is light, yet strong and durable.
Dies are held by bevel. No screws to break or get out of order.

LIST.

No. 1 Plate.—Cutting ¼, ⅜, ½, ¾ and 1 inch		$ 9 00
Price of Stock	Each,	2 00
Price of Dies	Each,	1 25
Price of Guides	Each,	50
No. 2 Plate.—Cutting 1¼, 1½ and 2 inches		$15 00
Price of Stock	Each,	5 25
Price of Dies	Each,	3 00
Price of Guides	Each,	75

This plate is packed same as shown above.
L. H. dies furnished at same prices.

LITTLE GIANT ADJUSTABLE PIPE PLATES.



LIST.

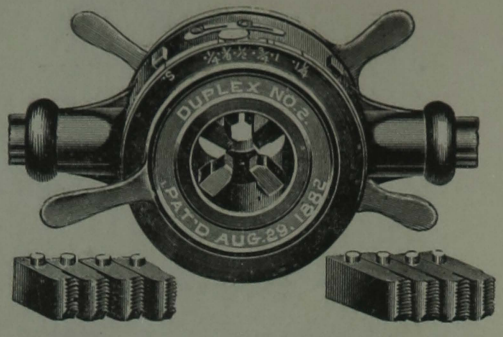
Numbers.

P 20.—For pipe 2½ and 3 inches	$50 00
P 21.—For pipe 2½, 3, 3½, 4 inches	60 00
P 22.—For pipe 3½ and 4 inches	50 00

PRICE OF PARTS.

Dies	Per set of 4 pieces,	$16 00
Bushings	Each,	1 50
Stock Wrench	Each,	75
Collar, Set or Leader Screw	Each,	25

These sets are furnished either for right or left hand.



ADJUSTABLE DUPLEX DIE STOCKS.

HART'S.

Numbers.	LIST.	With Cut-off.	Without Cut-off
1	With Dies for Threading ⅛, ¼, ⅜, ½ and ¾-inch Pipe.....	$16 00	$13 00
2	With Dies for Threading ¼, ⅜, ½, ¾, 1 and 1¼-inch Pipe.....	20 00	17 00
3	With Dies for Threading 1, 1¼, 1½ and 2-inch Pipe.....	25 00	22 00
3½	With Dies for Threading ½, ¾, 1, 1¼, 1½ and 2-inch Pipe.....	28 00	25 00
4	With Dies for Threading 1½, 2, 2½ and 3-inch Pipe.....	45 00	40 00
5	With Dies for Threading 2½, 3, 3½ and 4-inch Pipe.....	60 00	55 00

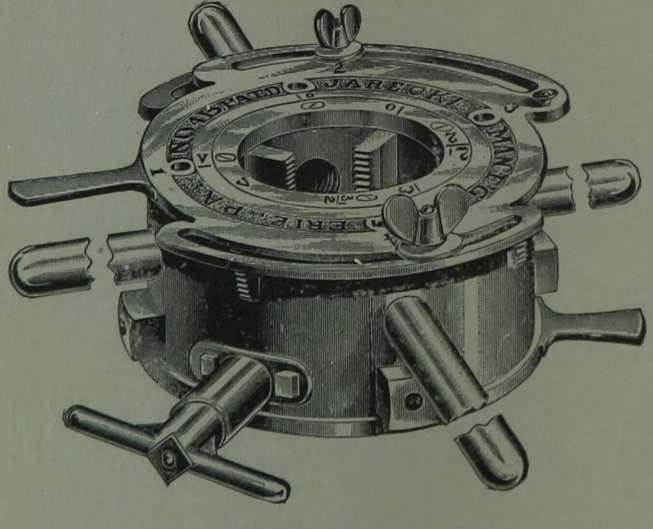
EXTRA DIES.

Numbers of Stock.....	1	2	3	3½	4	5
Price.....Per single set,	$1 50	1 75	2 00	2 00	3 50	4 00

EXTRA KNIVES.

Numbers of Stock.....	1	2	3	3½	4	5
Price.....Each,	$0 50	0 50	0 50	0 50	0 75	0 75

JARECKI SCREW PLATE AND PIPE CUTTERS.

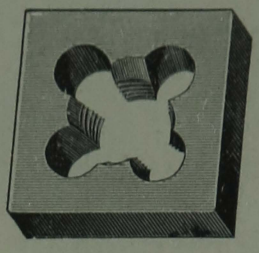


Numbers.	LIST.	Price.
1	Threads and Cuts, ¼, ⅜, ½, ¾.....	$14 00
2	Threads and Cuts, ½, ¾, 1, 1¼.....	16 00
3	Threads and Cuts, 1, 1¼, 1½, 2	20 00
3½	Threads and Cuts, ½, ¾, 1, 1¼, 1½, 2	22 50
4A	Threads and Cuts, 1½, 2, 2½, 3.....	35 00
4B	Threads and Cuts, 2½, 3, 3½, 4.....	50 00
5	Threads and Cuts, 4½, 5, 6.....	75 00
5A	Threads and Cuts, 6, 7, 8.....	125 00

EXTRAS.

LIST.

Numbers.....	1	2	3	3½ (2 SETS.)	4A	4B	5	5A
Dies, right or left hand.....Per set,	$2 00	2 00	2 00	4 00	3 00	3 00	6 00	6 00
Knives .....Each,	40	40	40	40	50	50	60	60



SOLID PIPE DIES.

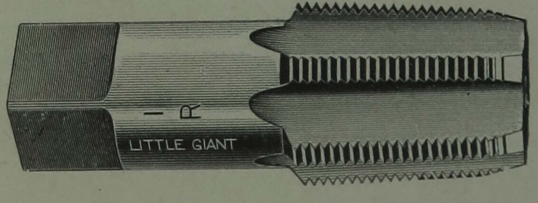
LIST.

Size. Inches.	Dimensions of Dies. Inches.	Price.	Price of Collets Fitted to Bolt Cutters.
⅛ to ½	2 x 2 x ½	$1 50	.....
¼ to 1	2½ x 2½ x ¾	2 00	$1 50
¾ to 1¼	3 x 3 x ¾	2 50	1 50
1 to 1½	3 x 3 x ¾	2 50	1 50
1¼ to 2	4 x 4 x ⅞	3 50	1 50
2½ to 3	5 x 5 x 1¼	9 00	....

Left-hand Dies furnished at same list prices.

Right-hand Dies always sent unless otherwise ordered.

These Dies will fit any make of stock, holding Dies of above dimensions.



PIPE TAPS.

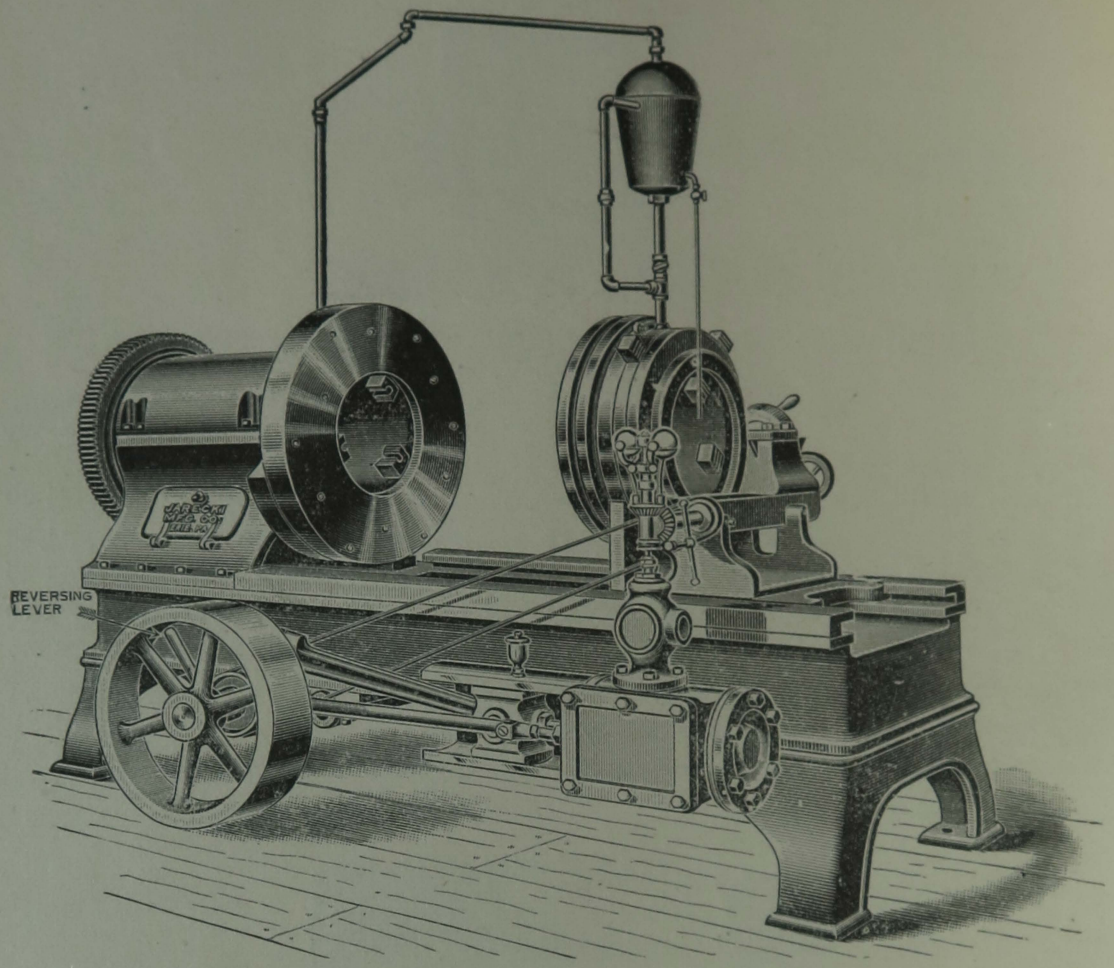
LIST.

Size	Inches,	⅛	¼	⅜	½	¾	1	1¼
Price	Each,	$1 12	1 25	1 50	1 87	2 50	3 12	3 75
Size	Inches,	1½	2	2½	3	3½	4	....
Price	Each,	$4 62	6 25	10 50	15 00	22 00	33 00	....

PIPE REAMERS.

LIST.

Size	Inches,	⅛	¼	⅜	½	¾	1	1¼
Price	Each,	$1 12	1 25	1 50	1 87	2 50	3 12	3 75
Size	Inches,	1½	2	2½	3	3½	4	....
Price	Each,	$4 62	6 25	10 50	15 00	22 00	33 00	....



JARECKI PIPE MACHINE.

2½ TO 8 INCH QUICK OPENING, ADJUSTABLE DIES.

Dimensions of cylinder, 6 x 8 inches. Governor pulley provided with steps for changing speed of engine. The fly wheel has a 4½-inch face for belting to a line shaft, if desired, for operating other machinery. The engine is so arranged that by the movement of a lever it can be disconnected from the Pipe Machine part.

When threading 6 inches and smaller, always insert the bushing or die supporter into die head to stiffen the dies.

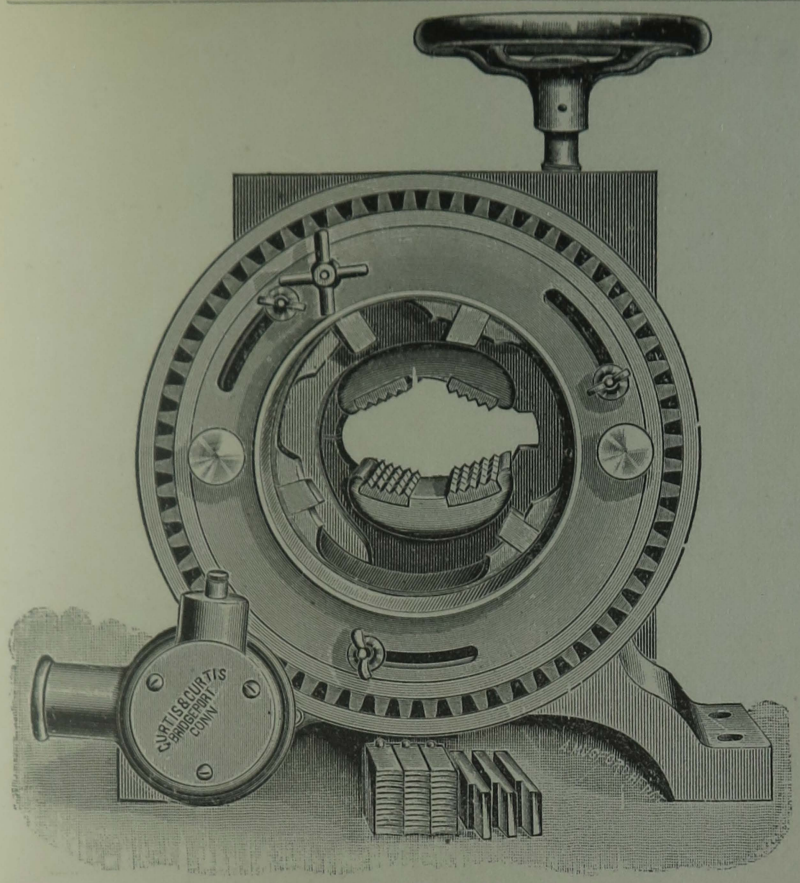
In order to reverse engine for cutting left-hand threads, loosen set screw in eccentric cam. Move cam by aid of reversing lever to the opposite slot on inside of rim of fly wheel.

LIST.

Price No. 14 Pipe Machine, including Right-Hand Dies, 2½ to 8 inches.....$950 00

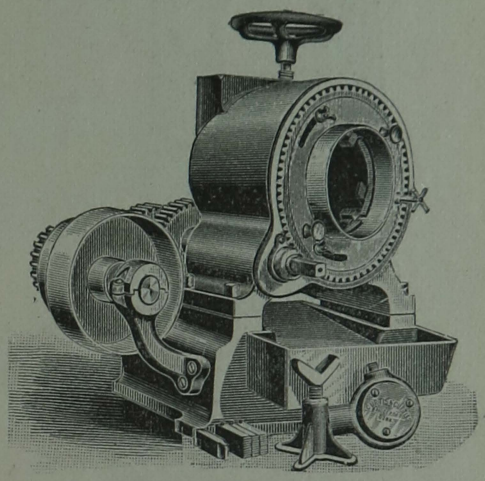
Price Extra Dies, 6 Sets Pipe Dies, Right or Left, at $7.00 per Set.... $42 00	One Set cuts these Two Sizes. 2½ and 3	One Set cuts these Two Sizes. 3½ and 4	One Set cuts these Two Sizes. 4½ and 5	6	7	8

Price Cutting-off Knife.....$1 00



As Arranged for Hand Power.

THE FORBES' PATENT DIE STOCKS.



As Arranged for Hand or Power.

LIST.

Numbers.	RANGE. Inches.	Weight. Pounds.	Price.
1	¼ to 2, R. and L.	80	$ 50 00
1½	1 to 3, R. H. 1 to 2, L. H.	115	75 00
2	2½ to 4, R. H.	175	85 00
2½	1½ to 4, R. H.	175	100 00
2½ A	1½ to 4, R. and L.	180	115 00
2½ B	1 to 4, R. H.	180	110 00
2½ C	1 to 4, R. and L.	185	130 00
3	4 to 6, R. H.	310	115 00
3 A	3½ to 6, R. H.	315	130 00
3 B	2½ to 5, R. H.	320	150 00
3 C	2½ to 6, R. H.	325	175 00
3 D	2½ to 8. R. H.	600	325 00

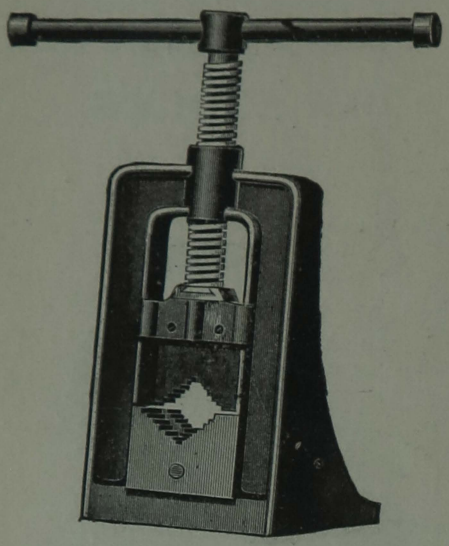
THE FOLLOWING PRICES INCLUDE COUNTER-SHAFT, RATCHET WRENCH AND PIPE REST.

LIST.

Numbers. Power.	RANGE. Inches.	Weight. Pounds.	Price.
*1	¼ to 2, R. and L.	250	$100 00
*1½	1 to 3. R. H. 1 to 2, L. H.	300	125 00
*1½ A	¾ to 3, R. H. ¾ to 2, L. H.	330	135 00
2	2½ to 4, R. H.	330	140 00
2½	1½ to 4, R. H.	330	150 00
2½ A	1½ to 4, R. and L.	330	165 00
2½ B	1 to 4, R. H.	330	160 00
2½ C	1 to 4, R. and L.	335	180 00
3	4 to 6, R. H.	440	170 00
3 A	3½ to 6, R. H.	450	180 00
3 B	2½ to 5, R. H.	500	200 00
3 C	2½ to 6, R. H.	510	225 00
3 F	1 to 6, R. H.	515	250 00
3 G	1 to 6, R. and L.	520	285 00
3 D	2½ to 8. R. H.	900	500 00

*Are not fitted with Cut-off Attachment.

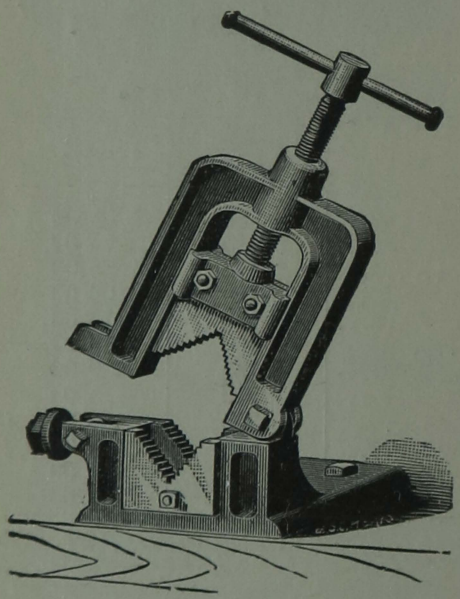
MALLEABLE PIPE VISES.



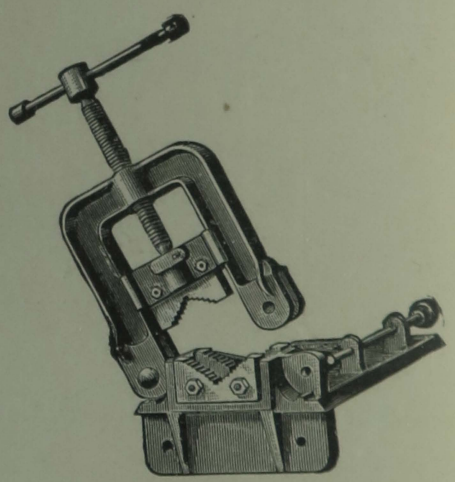
Holds ⅛ to 2-inch Pipe.

Malleable iron frame, Bessemer steel screw and lever, steel jaws, carefully milled and tempered.

Price.....Each, $8 00



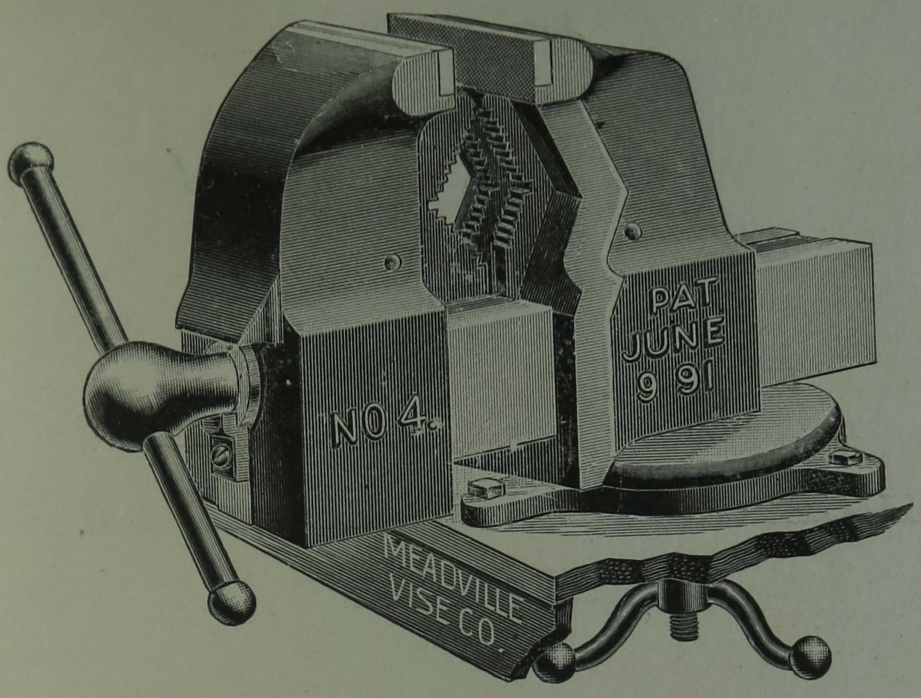
Frame of best malleable iron, hinged as shown in the cut, screw and lever of Bessemer steel, milled and tempered steel jaws.



Are made with malleable iron frame, Bessemer steel screw and lever, milled and tempered steel jaws.

LIST.

Numbers.	Holds Pipe. Inches.	Price.	Numbers.	Holds Pipe. Inches.	Weight. Pounds.	Price.
5 A	⅛ to 2½	$10 00	15 A	½ to 3	25	$13 00
10 A	½ to 4	14 00	20 A	½ to 4	35	18 00
.....	.....	.....	25 A	1 to 6	80	30 00

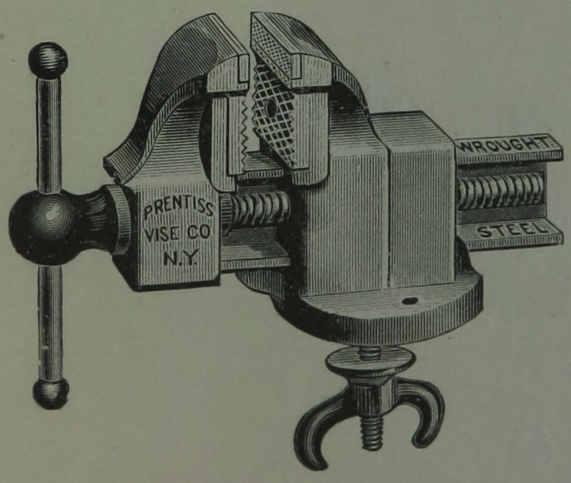


COMBINATION VISES.

MEADVILLE.

LIST.

Numbers.			Price.
1	Holds ⅛ to 2-inch pipe	Each,	$16 00
2	Holds ⅛ to 3 inch pipe	Each,	20 00
3	Holds ⅛ to 4-inch pipe	Each,	28 00
4	Holds ⅛ to 6-inch pipe	Each,	35 90



COMBINATION PIPE VISES.

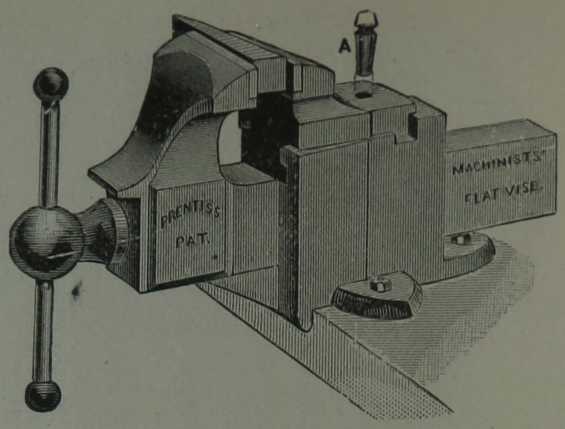
PRENTISS.

The grip plates are made of best steel, carefully tempered, and are deeply serrated at right angles, forming innumerable points. These heavy steel plate pipe jaws are reversible and interchangeable, and are full width of vise, thereby giving greater holding contact, with much less pressure on the pipe than with old style concave jaws.

Pipe may be held at various angles and a slight turn of lever releases it.

LIST.

Numbers.		Price.
81	Jaws 3½ inches, holds ⅛ to 2½-inch pipe. Weight 35 pounds	$16 00
82	Jaws 4¼ inches, holds ⅛ to 4-inch pipe. Weight 55 pounds	20 00
83	Jaws 5 inches, holds ⅛ to 6-inch pipe. Weight 100 pounds	30 00

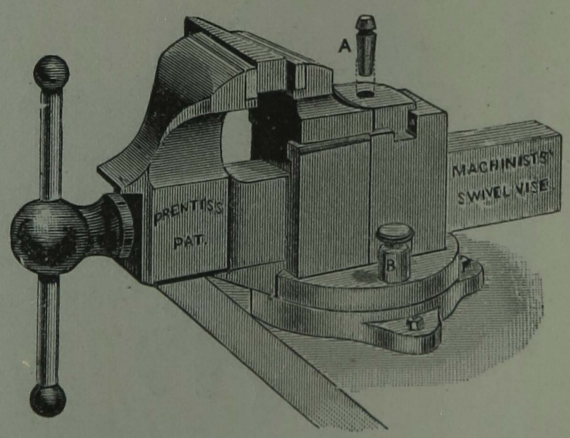


MACHINISTS' SELF-ADJUSTING JAW VISES.

STATIONARY BOTTOM.

LIST.

Numbers.		Price.
1	2⅝-inch Jaws; opens 3½ inches; weight 13½ pounds	$ 5 50
2	3½-inch Jaws; opens 4¾ inches; weight 28 pounds	7 00
2½	4-inch Jaws; opens 5¼ inches; weight 41 pounds	9 00
3	4½-inch Jaws; opens 6 inches; weight 54 pounds	10 50
4	5¼-inch Jaws; opens 8 inches; weight 96 pounds	17 00
5	6-inch Jaws; opens 9 inches; weight 146 pounds	24 00
6	7-inch Jaws; opens 11 inches; weight 184 pounds	30 00

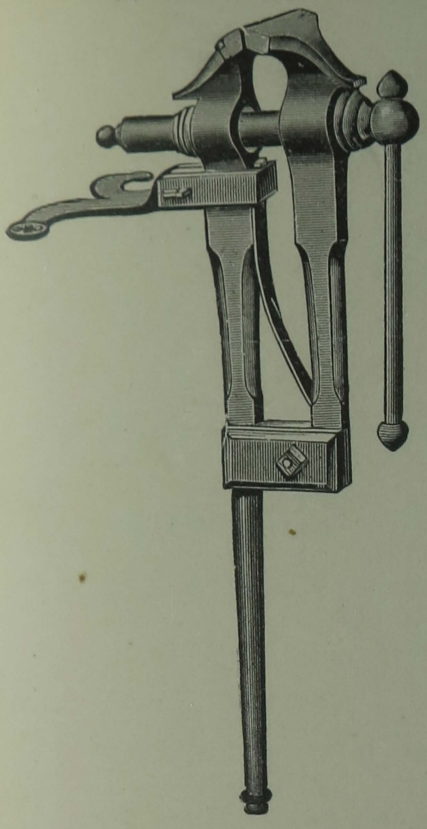


SWIVEL BOTTOM.

LIST.

Numbers.		Price.
18	2⅝-inch Jaws; opens 3½ inches; weight 17 pounds	$ 6 75
19	3½-inch Jaws; opens 4¾ inches; weight 32 pounds	8 50
19½	4-inch Jaws; opens 5¼ inches; weight 46 pounds	10 50
20	4½-inch Jaws; opens 6 inches; weight 65 pounds	12 50
21	5¼-inch Jaws; opens 8 inches; weight 109 pounds	19 00
22	6-inch Jaws; opens 9 inches; weight 168 pounds	27 00
23	7-inch Jaws; opens 11 inches; weight 207 pounds	35 00

WROUGHT IRON SOLID BOX VISES.



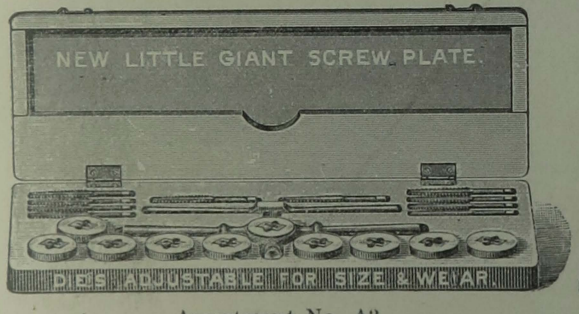
LIST.

Width of Jaw. Inches.	Weight, About. Pounds.	Price.	Width of Jaw. Inches.	Weight, About. Pounds.	Price.
3¾	35	$10 00	6	100	$22 00
4	40	10 50	6	110	24 00
4¼	45	11 00	6	115	25 00
4½	50	11 50	6½	120	26 00
4¾	55	12 00	6½	125	27 50
5	60	13 00	6½	130	29 00
5	65	14 00	7	140	33 00
5¼	70	15 00	7	150	36 00
5¼	75	16 00	7¼	160	41 50
5½	80	17 50	7¼	170	44 50
5½	85	18 50	7½	180	47 00
5¾	90	20 00	7¾	190	53 00
5¾	95	21 00	8	200	56 00

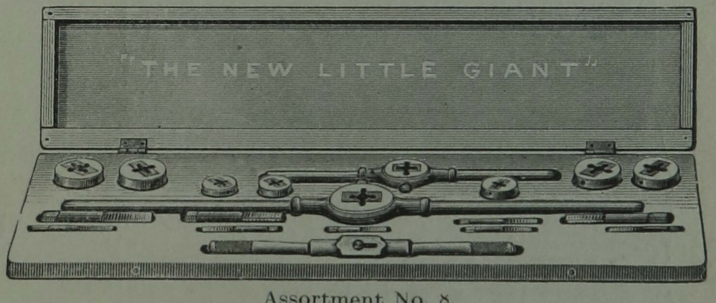
In ordering Solid Box Vises give width of Jaw and approximate weight.

LITTLE GIANT SCREW PLATES.

WELLS BROS.

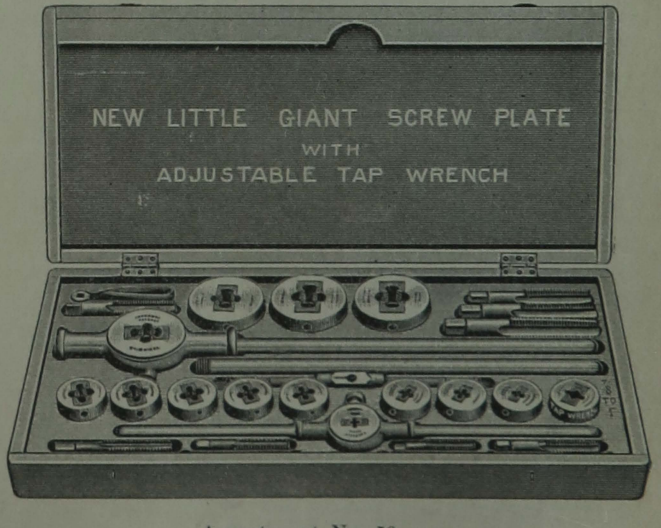


Assortment No. A3.



Assortment No. 8.

Assortment No. 7.



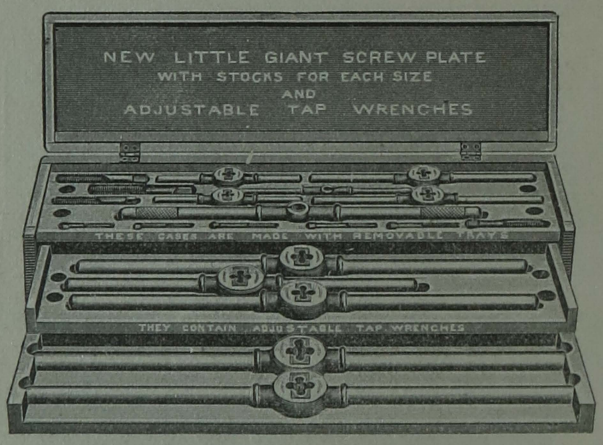
Assortment No. 50.

LITTLE GIANT SCREW PLATES—Continued.

LIST.

Each Assortment is put up in a neat Wood Case, as shown in cuts.

Numbers.			Price.
A1	Has Stock and Tap Wrench.	Cuts 1/8, 5/32, 3/16, 7/32, 1/4	$ 6 50
A2	Has Stock and Tap Wrench.	Cuts 7/64, 1/8, 9/64, 5/32, 3/16, 7/32, 1/4	8 00
A3	Has Stock and Tap Wrench.	Cuts 7/64, 1/8, 9/64, 5/32, 11/64, 3/16, 13/64, 7/32, 15/64, 1/4	10 50
1	Has Stock 14½ inches long.	Cuts 1/4, 5/16, 3/8, 7/16, 1/2	12 00
2	Has Stock 23 inches long.	Cuts 1/4, 3/8, 1/2, 5/8, 3/4	13 50
3	Has Stock 26 inches long.	Cuts 5/8, 3/4, 7/8, 1 inch	15 00
4	Has Stock 26 inches long.	Cuts 1/2, 5/8, 3/4, 7/8, 1 inch	17 50
5	Has Stock 23 inches long.	Cuts 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4	16 00
5½	Has Stock 23 inches long.	Cuts 1/4, 5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 3/4	18 50
6	Has Stock 26 inches long.	Cuts 3/8, 7/16, 1/2, 5/8, 3/4, 7/8, 1 inch	22 00
7	Has Stock 26 inches long.	Cuts 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4, 7/8, 1 inch	25 50
8	Has Stock 14½ inches long for first four sizes, and 26-inch Stock for the larger sizes.	Cuts 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4	18 00
9	Has Stock 14½ inches long for first four sizes, and 29-inch Stock for the larger sizes.	Cuts 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4, 7/8, 1 inch	27 50
20	Has Stock 40 inches long.	Cuts 5/8, 3/4, 7/8, 1, 1⅛, 1¼ inches	35 00
25	Has Stock 52 inches long.	Cuts 7/8, 1, 1⅛, 1¼, 1⅜, 1½ inches	45 00
30	Has Stock 52 inches long.	Cuts 1⅛, 1¼, 1⅜, 1½ inches	37 50
40	Has Stock 23 inches long for first seven sizes, and 40-inch Stock for the larger sizes.	Cuts 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4, 7/8, 1, 1⅛, 1¼ inches	40 00
50	Has Stock 26 inches long for first nine sizes, and 52-inch Stock for the larger sizes	Cuts 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4, 7/8, 1, 1⅛, 1¼, 1⅜, 1½ inches	60 00



LITTLE GIANT FULL-STOCKED SCREW PLATES.

A Stock for Each Die.

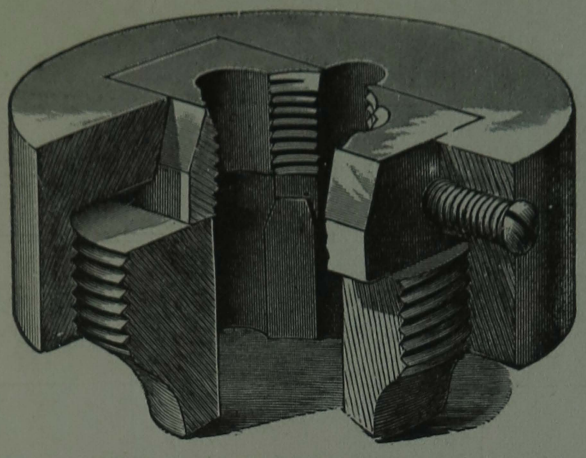
Each of the following assortments is put up in a neat Wood Case, and contains an Adjustable Tap Wrench suitable for holding taps for each assortment, similar to that shown in cut.

LIST.

Numbers.		Price.
61	Cutting 1/4 20, 5/16 18, 3/8 16, 7/16 14, 1/2 12	$12 00
62	Cutting 1/4 20, 3/8 16, 1/2 12, 5/8 11, 3/4	15 50
65	Cutting 1/4 20, 5/16 18, 3/8 16, 7/16 14, 1/2 12, 5/8 11, 3/4 10	18 00
65½	Cutting 1/4 20, 5/16 18, 3/8 16, 7/16 14, 1/2 12, 9/16 12, 5/8 11, 3/4 10	20 50
66	Cutting 3/8 16, 7/16 14, 1/2 12, 5/8 11, 3/4 10, 7/8 9, 1 8	24 00
67	Cutting 1/4 20, 5/16 18, 3/8 16, 7/16 14, 1/2 12, 5/8 11, 3/4 10, 7/8 9, 1 8	29 50
640	Cutting 1/4 20, 5/16 18, 3/8 16, 7/16 14, 1/2 12, 5/8 11, 3/4 10, 7/8 9, 1 8, 1⅛ 7, 1¼ 7	47 00
650	Cutting 1/4 20, 5/16 18, 3/8 16, 7/16 14, 1/2 12, 5/8 11, 3/4 10, 7/8 9, 1 8, 1⅛ 7, 1¼ 7, 1⅜ 6, 1½ 6	67 00

Numbers 66, 67, 640 and 650 plates have two tap wrenches. These plates are put up (unless otherwise ordered) with V form of thread, *rough iron sizes.* We also furnish United States Standard or Whitworth forms of thread, if desired, at same list price. Plates of these forms of thread are always sent exact size, unless otherwise ordered.

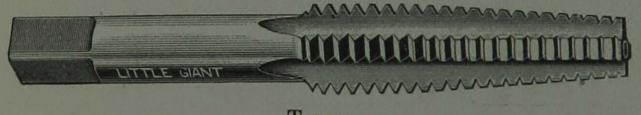
When ordering, state plainly the number of assortment and form of thread wanted.



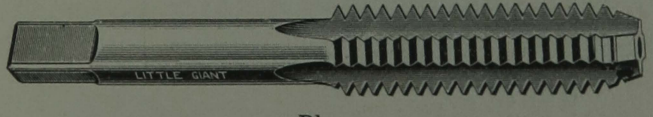
LITTLE GIANT ADJUSTABLE DIES AND COLLETS.

LIST.

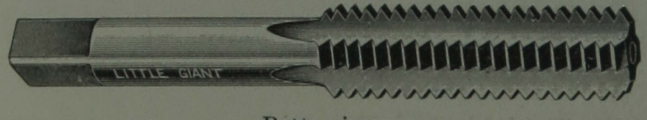
Diameter. Inches.	Regular Number of Threads to Inch.	Price of Die.	Die and Collet For Plates Nos. 1 to 9.	Diameter. Inches.	Regular Number of Threads to Inch.	Price of Die.	Die and Collet For Plates Nos. 1 to 9.
3/16	24	$ 1 00	$ 1 50	3/4	10	$ 2 00	$ 2 50
1/4	20	1 00	1 50	13/16	10	2 00	2 50
5/16	18	1 00	1 50	7/8	9	2 75	3 25
3/8	16	1 25	1 75	15/16	9	2 75	3 25
7/16	14	1 25	1 75	1	8	2 75	3 25
1/2	12	1 50	2 25	1 1/8	7	4 00	....
9/16	12	1 50	2 25	1 1/4	7	4 00	....
5/8	11	1 75	2 25	1 3/8	6	5 00	....
11/16	11	1 75	2 25	1 1/2	6	5 00	....



Taper.



Plug.



Bottoming.

MACHINISTS' HAND TAPS.

LIST.

Diameter. Inches.	Number of Threads to Inch, V Form.	Price Each.	Price Per Set.	Diameter. Inches.	Number of Threads to Inch, V Form.	Price Each.	Price Per Set.
3/16	24, 32	$ 35	$ 1 05	7/8	9, 10, 12	$ 1 60	$ 4 80
1/4	18, 20, 22, 24	45	1 35	15/16	9, 10, 12	1 80	5 40
5/16	16, 18, 20	50	1 50	1	9, 12,	2 00	6 00
3/8	14, 16, 18	55	1 65	1 1/8	7, 10, 12	2 25	6 75
7/16	12, 14, 16	60	1 80	1 1/4	7, 10, 12	2 60	7 80
1/2	12, 13, 14	70	2 10	1 3/8	6	3 00	9 00
9/16	11, 12, 13	80	2 40	1 1/2	6	3 50	10 50
5/8	10, 11, 12	90	2 70	1 5/8	5, 5 1/2	4 20	12 60
11/16	10, 11, 12	1 05	3 15	1 3/4	5	5 00	15 00
3/4	10, 11, 12	1 20	3 60	1 7/8	4 1/2, 5	5 80	17 40
13/16	9, 10, 12	1 40	4 20	2	4 1/2	6 70	20 10

MACHINE SCREW TAPS.

LIST.

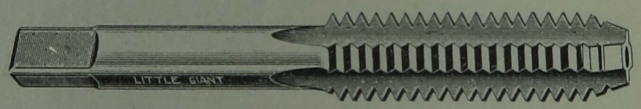
Diameter, Fractions of an Inch.	Number of Threads to Inch.	Screw Gauge Sizes.	PRICE. Each.	PRICE. Per Dozen.	Diameter, Fractions of an Inch.	Number of Threads to Inch.	Screw Gauge Sizes.	PRICE. Each.	PRICE. Per Dozen.
	56, 60, 64, 72	1	$0 35	$4 00	1/4	16, 18, 20, 22, 24, 26	14	38	4 40
	48, 56, 64	2	35	4 00		18, 20, 22, 24	15	38	4 40
	40, 44, 48, 56	3	35	4 00	17/64	16, 18, 20, 22, 24, 26	16	38	4 40
7/64	30, 32, 36, 40, 42, 44, 48	4	35	4 00		16, 18, 20	17	38	4 40
	30, 32, 36, 40, 44, 48	5	35	4 00	9/32	16, 18, 20, 22, 24, 26	18	38	4 40
9/64	30, 32, 36, 38, 40, 44, 48	6	35	4 00		16, 18, 20, 22, 24	19	38	4 40
	24, 28, 30, 32, 36, 40	7	35	4 00	5/16	16, 18, 20, 22, 24	20	45	5 30
5/32	24, 30, 32, 36, 40, 44	8	35	4 00		16, 18	22	45	5 30
	24, 28, 30, 32	9	35	4 00	3/8	14, 16, 18, 20, 22, 24	24	45	5 30
3/16	20, 22, 24, 28, 30, 32, 36	10	35	4 00		14, 16	26	53	6 30
	22, 24, 28, 30	11	35	4 00		14, 16	28	53	6 30
7/32	20, 22, 24, 26, 28, 30, 32, 34, 36	12	35	4 00		14, 16	30	53	6 30
	20, 22, 24, 32	13	38	4 40	.....	....	.....	.....	.....

Less than six of a size will be charged as single taps.
Other sizes and threads are special. Prices on application.
When ordered, taps will be furnished in sets—taper, plug and bottoming—like sets of hand taps.

SHORT PLUG HOB TAPS, FOR OPEN DIES.

LIST.

Size. Inches.	Regular Number of Threads, V Form	Price.	Size. Inches.	Number of Threads.	Price.
3/16	24	$ 60	7/8	9	$2 10
1/4	20	60	15/16	9	2 40
5/16	18	70	1	8	2 80
3/8	16	80	1 1/8	7	3 20
7/16	14	90	1 1/4	7	3 70
1/2	12	1 00	1 3/8	6	4 20
9/16	12	1 15	1 1/2	6	4 70
5/8	11	1 30	1 5/8	5	5 30
11/16	11	1 45	1 3/4	5	6 00
3/4	10	1 60	1 7/8	5	6 80
13/16	10	1 80	2	4 1/2	7 70

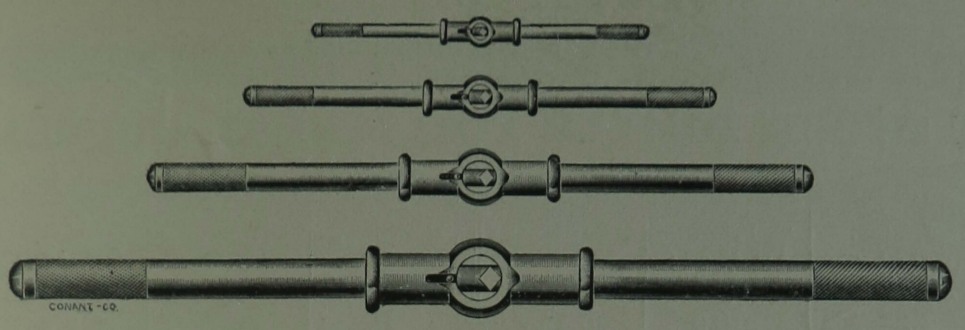


PATCH BOLT TAPS, FOR BOILER MAKERS.

LIST.

Size Inches.	Number of Threads.	Price.	Size. Inches.	Number of Threads.	Price.
1/2	12	$ 70	13/16	12	$1 40
9/16	12	80	7/8	12	1 60
5/8	12	90	15/16	12	1 80
11/16	12	1 05	1	12	2 00
3/4	12	1 20	....	....	.....

These taps are slightly tapered to make a steam-tight fit.
Size given in size of tap at about 5/8-inch from large end of thread.



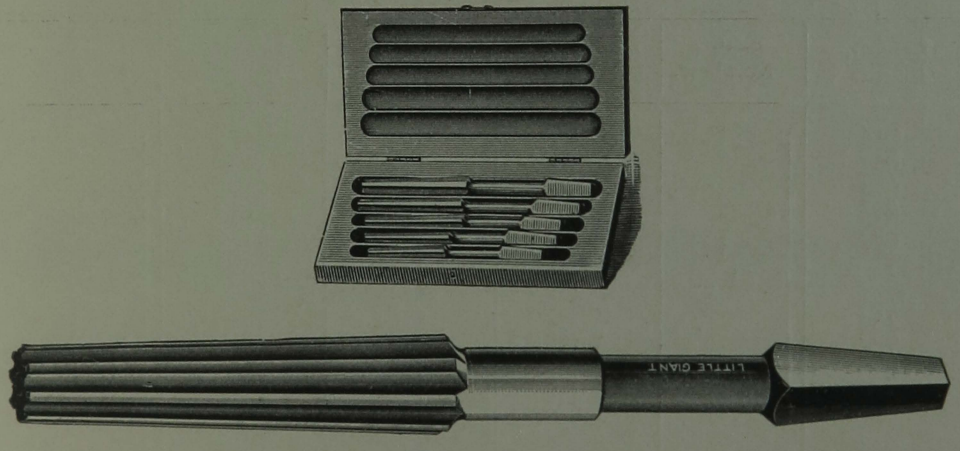
LITTLE GIANT ADJUSTABLE TAP WRENCHES.

LITTLE GIANT TAP AND REAMER WRENCHES.

LIST.

Numbers.	Length—Inches.		Price.
11	10½	Holds Taps from ¼ to ½ inch	$1 50
13	14½	Holds Taps from ¼ to ¾ inch	2 00
15	22	Holds Taps from ¼ to 1 inch	2 75
17	40	Holds Taps from ¾ to 1½ inches	5 00

Handles are of pipe, making them light. These Wrenches are used in our full stocked plates for sizes to 1½ inches. When ordering give number.



LITTLE GIANT REAMERS.

FOR BIT BRACE USE.

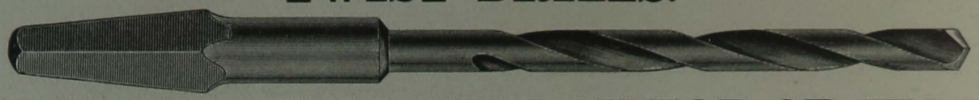
For reaming out and making true, smooth holes in wood or iron. Each Reamer tapers ⅛ of an inch, and follows from the smallest to the largest. These will be found very useful tools.

LIST.

Size.....Inches,	¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾
Price.....Per dozen,	$2 40	3 00	3 60	4 20	4 80	6 00	7 20	8 40	9 60
Price.....Each,	20	25	30	35	40	50	60	70	80

Set of five, ¼ to ½ inclusive, in case as above	$1 70
Set of five, ¼ to ½ inclusive, without case	1 50
Set of nine, ¼ to ¾ inclusive, in case	4 40
Set of nine, ¼ to ¾ inclusive, without case	4 10

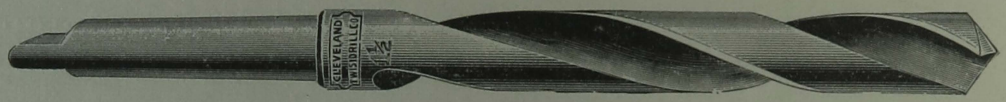
TWIST DRILLS.



BIT STOCK DRILLS FOR METAL OR WOOD.

LIST.

Diameter. Inches.	Length. Inches.	Price. Per Dozen.	Price. Each.	Diameter. Inches.	Length. Inches.	Price. Per Dozen.	Price. Each.
2/32	3 9/16	$1 50	$0 14	14/32	6½	$ 8 80	$ 75
3/32	4	1 65	16	15/32	6¾	9 60	82
4/32	4⅛	2 10	20	16/32	7	10 30	87
5/32	4 9/16	2 60	24	17/32	7⅛	11 00	92
6/32	5	3 10	29	9/16	7½	14 35	1 20
7/32	5¼	3 60	33	5/8	7½	16 15	1 35
8/32	5½	4 10	38	11/16	7½	17 95	1 50
9/32	5¾	4 70	43	¾	7½	19 75	1 65
10/32	6	5 40	48	13/16	7½	21 55	1 80
11/32	5⅝	6 30	54	⅞	7½	23 35	1 95
12/32	6	7 20	62	15/16	7½	25 75	2 15
13/32	6¼	8 00	68	1	7½	28 15	2 35

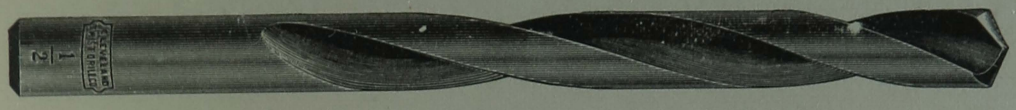


TAPER SHANK DRILLS.

LIST.

Diameter. Inches.	Length. Inches.	Socket. Numbers.	Price. Each.	Diameter. Inches.	Length. Inches.	Socket. Numbers.	Price. Each.
¼	6⅛		$ 60	1 9/32	14⅛		$ 4 65
9/32	6¼		65	1 5/16	14¼		4 80
5/16	6⅜		70	1 11/32	14⅜		5 00
11/32	6½		75	1⅜	14½		5 20
⅜	6¾		80	1 13/32	14⅝		5 40
13/32	7	1	85	1 7/16	14¾		5 60
7/16	7¼	$1 20	90	1 15/32	14⅞		5 80
15/32	7½		95	1½	15	Discount changes at 1½.	6 00
½	7¾		1 00				
17/32	8		1 10	1 17/32	15⅛		6 30
9/16	8¼		1 20	1 9/16	15¼		6 60
				1 19/32	15⅜	4	6 90
19/32	8½		1 30	1 5/8	15½	$4 00	7 20
5/8	8¾		1 40	1 21/32	15⅝		7 50
21/32	9		1 50	1 11/16	15¾		7 80
11/16	9¼		1 60	1 23/32	15⅞		8 10
23/32	9½		1 70	1¾	16		8 40
¾	9¾	2	1 85	1 25/32	16⅛		8 60
25/32	9⅞	$1 80	2 00	1 13/16	16¼		8 80
13/16	10		2 15	1 27/32	16⅜		9 00
27/32	10¼		2 30	1⅞	16½		9 20
⅞	10½		2 45	1 29/32	16½		9 35
29/32	10⅝		2 60	1 15/16	16½		9 50
				1 31/32	16½		9 65
15/16	10¾		2 75	2	16½		9 80
31/32	10⅞		2 90				
1	11		3 00	2 1/32	16½		10 20
1 1/32	11⅛		3 20	2 1/16	17		10 60
1 1/16	11¼		3 40	2⅛	17		11 20
1 3/32	11½	3	3 60	2 3/16	17	5	12 00
1⅛	11¾	$2 50	3 80	2¼	17½	$7 50	12 80
1 5/32	11⅞		4 00	2 5/16	17½		13 60
1 3/16	12		4 20	2⅜	18		14 40
1 7/32	12⅛		4 40	2 7/16	18½		15 00
1¼	12½		4 50	2½	19		15 60

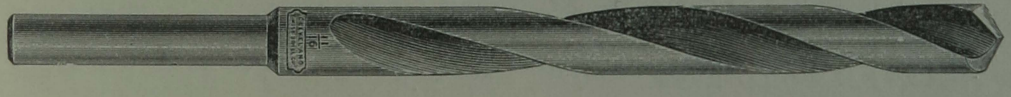
TWIST DRILLS—Continued.



STRAIGHT SHANK DRILLS.

LIST.

Diameter. Inches.	Length. Inches.	Price Per Dozen.	Price Each.	Diameter. Inches.	Length. Inches.	Price Per Dozen.	Price Each.
1/16	2 1/2	$ 1 00	$ 0 09	12/64	4 3/8	$ 3 90	$ 0 35
5/64	2 5/8	1 10	10	5/16	4 1/2	4 20	37
3/32	2 3/4	1 20	11	21/64	4 5/8	4 50	40
7/64	2 7/8	1 30	12	11/32	4 3/4	4 80	42
1/8	3	1 45	13	23/64	4 7/8	5 10	45
9/64	3 1/8	1 60	15	3/8	5	5 40	48
5/32	3 1/4	1 80	16	25/64	5 1/8	5 70	50
11/64	3 3/8	2 00	18	13/32	5 1/4	6 00	53
3/16	3 1/2	2 20	20	27/64	5 3/8	6 40	55
13/64	3 5/8	2 40	21	7/16	5 1/2	6 80	59
7/32	3 3/4	2 65	23	29/64	5 5/8	7 20	63
15/64	3 7/8	2 90	26	15/32	5 3/4	7 50	65
1/4	4	3 15	28	31/64	5 7/8	7 75	67
17/64	4 1/8	3 40	30	1/2	6	8 00	70
9/32	4 1/4	3 65	32	..	...	....	....



STRAIGHT SHANK DRILLS.

FOR BLACKSMITH DRILL PRESSES.

Drills have Shanks 2½ inches long and ½ inch diameter.

LIST.

Diameter. Inches.	Length. Inches.	Price Each.	Diameter. Inches.	Length. Inches.	Price Each.	Diameter. Inches.	Length. Inches.	Price Each.
1/8	5 1/8	$ 0 45	7/16	7 1/4	$ 90	25/32	9 7/8	$ 2 00
5/32	5 3/8	45	15/32	7 1/2	95	13/16	10	2 15
3/16	5 5/8	50	1/2	7 3/4	1 00	27/32	10 1/4	2 30
7/32	5 7/8	55	17/32	8	1 10	7/8	10 1/2	2 45
1/4	6 1/8	60	9/16	8 1/4	1 20	29/32	10 5/8	2 60
9/32	6 1/4	65	19/32	8 1/2	1 30	15/16	10 3/4	2 75
5/16	6 3/8	70	5/8	8 3/4	1 40	31/32	10 7/8	2 90
11/32	6 1/2	75	21/32	9	1 50	1	11	3 00
3/8	6 3/4	80	11/16	9 1/4	1 60	1 1/32	11 1/8	3 20
13/32	7	85	3/4	9 3/4	1 85	1 1/16	11 1/4	3 40

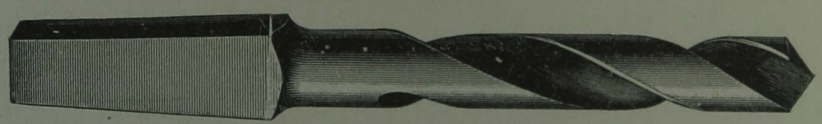
TWIST DRILLS—Continued.

DRILLS FOR BLACKSMITHS' DRILL PRESSES.

Shanks are .648—exact diameter—commonly called 5/8.

LIST.

Diameter. Inches.	Length. Inches.	Price. Each.	Diameter. Inches.	Length. Inches.	Price. Each.
1/8	4 7/8	$ 55	27/32	6	$1 40
5/32	5 5/8	58	7/8	6	1 45
3/16	6	60	29/32	6	1 55
7/32	6	65	15/16	6	1 60
1/4	6	70	31/32	6	1 70
9/32	6	73	1	6	1 80
5/16	6	75	1 1/32	6	1 90
11/32	6	80	1 1/16	6	2 00
3/8	6	85	1 3/32	6	2 10
13/32	6	88	1 1/8	6	2 20
7/16	6	90	1 5/32	6	2 25
15/32	6	93	1 3/16	6	2 30
1/2	6	95	1 7/32	6	2 35
17/32	6	98	1 1/4	9	2 40
9/16	6	1 00	1 9/32	6	2 50
19/32	6	1 03	1 5/16	6	2 60
5/8	6	1 05	1 11/32	6	2 70
21/32	6	1 10	1 3/8	6	2 80
11/16	6	1 15	1 13/32	6	2 90
23/32	6	1 20	1 7/16	6	3 00
3/4	6	1 25	1 15/32	6	3 10
25/32	6	1 30	1 1/2	6	3 20
13/16	6	1 35			



SQUARE SHANK RATCHET DRILLS.

LIST.

Diameter. Inches.	Length. Inches.	Price. Each.	Diameter. Inches.	Length. Inches.	Price. Each.
1/4	5	$1 00	29/32	7 1/2	$2 15
9/32	5	1 05	15/16	8	2 30
5/16	5	1 10	31/32	8	2 45
11/32	5	1 15	1	8 1/2	2 55
3/8	6	1 20	1 1/32	8 1/2	2 70
13/32	6 1/4	1 25	1 1/16	8 1/2	2 85
7/16	6 1/4	1 25	1 3/32	8 1/2	3 00
15/32	6 1/4	1 30	1 1/8	9	3 10
1/2	6 1/2	1 30	1 5/32	9	3 25
17/32	6 1/2	1 35	1 3/16	9	3 40
9/16	6 1/2	1 35	1 7/32	9	3 55
19/32	6 1/2	1 40	1 1/4	9 1/2	3 75
5/8	6 1/2	1 40	1 9/32	9 1/2	3 95
21/32	6 1/2	1 45	1 5/16	9 1/2	4 20
11/16	6 1/2	1 45	1 11/32	9 1/2	4 45
23/32	6 1/2	1 50	1 3/8	10	4 70
3/4	6 1/2	1 55	1 13/32	10	4 95
25/32	6 1/2	1 65	1 7/16	10	5 25
13/16	7	1 75	1 15/32	10	5 50
27/32	7	1 90	1 1/2	10	5 75
7/8	7 1/2	2 05			

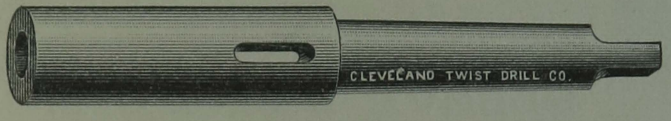
STEEL SOCKETS FOR TAPER SHANK DRILLS.

MORSE TAPER.

ROUGH.

LIST.

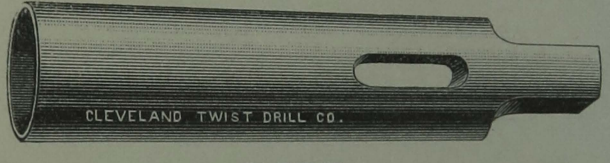
Numbers.	Price.
1, Holds ¼ to $\frac{5}{16}$ inch inclusive	$1 20
2, Holds $\frac{13}{32}$ to $\frac{33}{32}$ inch inclusive	1 80
3, Holds $\frac{15}{16}$ to 1¼ inch inclusive	2 50
4, Holds $1\frac{9}{32}$ to 2 inches inclusive	4 00
5, Holds $2\frac{1}{16}$ to 2½ inches inclusive	7 50



FITTED.

LIST.

Numbers.	Price.
1, With Shank fitted to No. 2 or 3 Socket	$2 00
2, With Shank fitted to No. 3 Socket	2 50
3, With Shank fitted to No. 4 Socket	3 20
4, With Shank fitted to No. 5 Socket	4 80



SLEEVE.

LIST.

Numbers.	Price.
1, Fitted to No. 2 or 3 Socket	$1 80
2, Fitted to No. 3 Socket	2 40
3, Fitted to No. 4 Socket	3 00
4, Fitted to No. 5 Socket	4 40

TAPER REAMERS FOR DRILL SOCKETS.

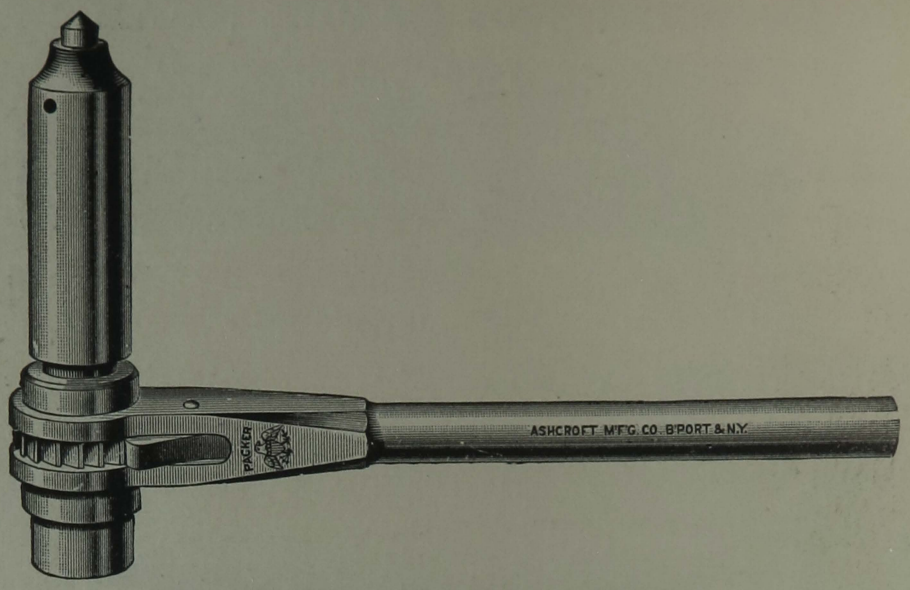
LIST.

Number of Reamer.	Full Length. Inches.	Length of Flute. Inches.	Taper.	Price.
1	5⅞	3½	.5415 by .365	$2 00
2	7½	4½	.797 by .572	2 60
3	8¼	5	1.025 by .775	3 40
4	9	5½	1.303 by 1.021	4 20
5	9⅞	5⅞	1.786 by 1 480	6 60

BOILER MAKERS' STEEL SCREW PUNCHES.

LIST.

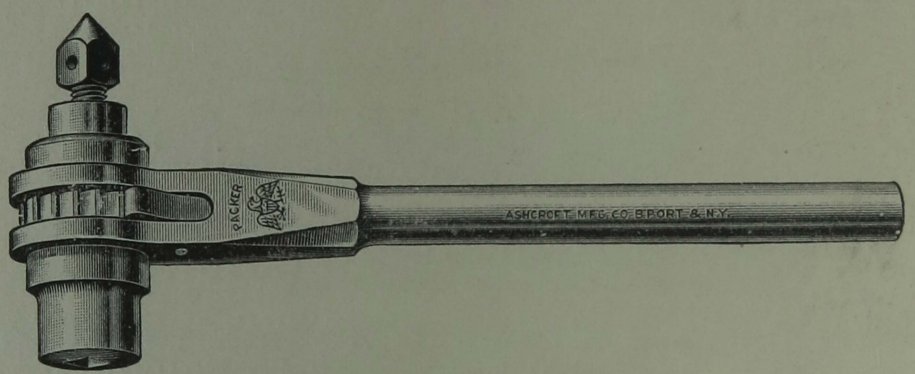
Numbers.	Price.
0 Punches ½-inch hole in ¼-inch iron, 1½ inches from edge of sheet, 17 pounds	$24 00
1 Punches ½-inch hole in $\frac{5}{16}$-inch iron, 1½ inches from edge of sheet, 27 pounds	30 00
2 Punches ¾-inch hole in ½-inch iron, 2 inches from edge of sheet, 40 pounds	40 00
3 Punches ¾-inch hole in ¾-inch iron, 2½ inches from edge of sheet, 60 pounds	60 00
3½ Punches ¾-inch hole in ¾-inch iron, 3½ inches from edge of sheet, 90 pounds	75 00
4 Punches ¾-inch hole in ¾-inch iron, 4 inches from edge of sheet, 110 pounds	80 00



SLEEVE RATCHETS.

LIST.

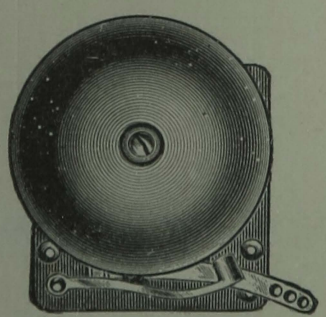
Numbers		1	2	3	4	5
Size	Inches,	10	12	16	18	20
Price	Each,	$10 50	13 50	16 00	19 00	23 00



BOILER RATCHETS.

LIST.

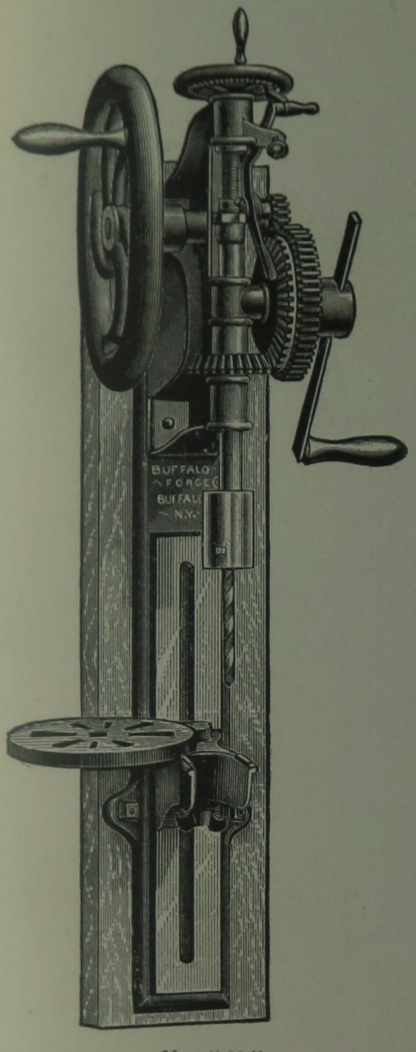
Numbers		1	2
Size	Inches,	10	12
Price	Each,	$ 9 00	10 50



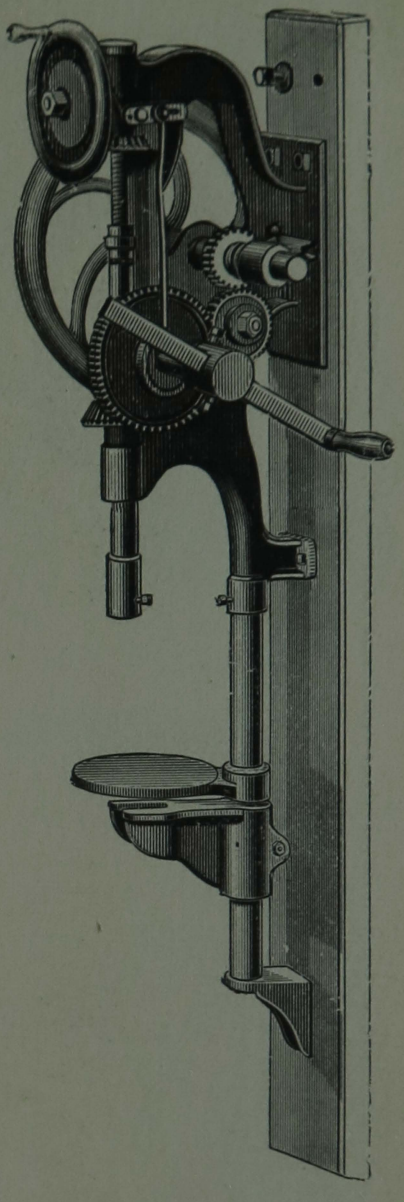
GONG BELLS.

LIST.

Size	Inches,	4	5	6	7	8	10	12
Price	Each,	$ 2 75	3 25	3 90	5 00	6 00	8 00	14 00



No. "66."



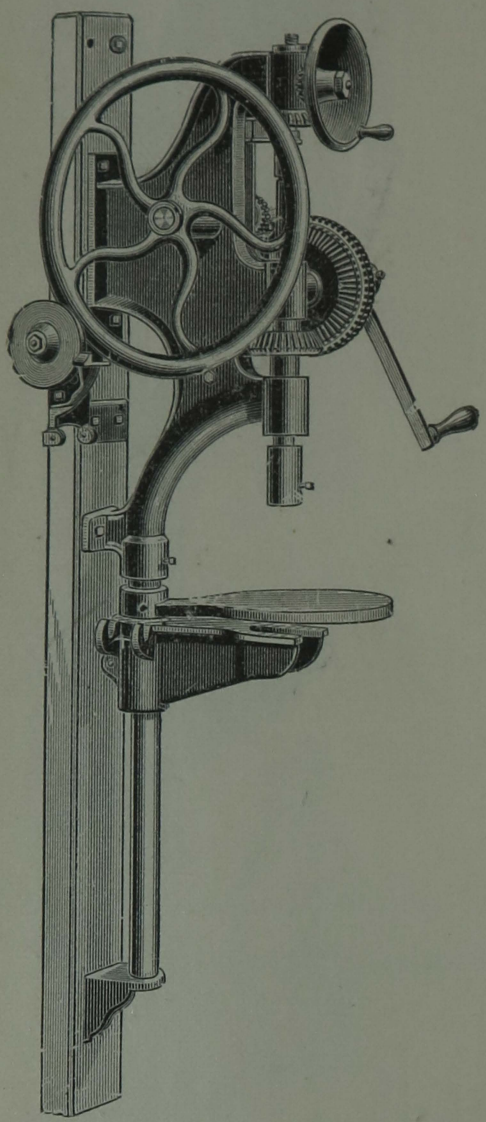
No. 71.

BUFFALO BLACKSMITHS' DRILLS.

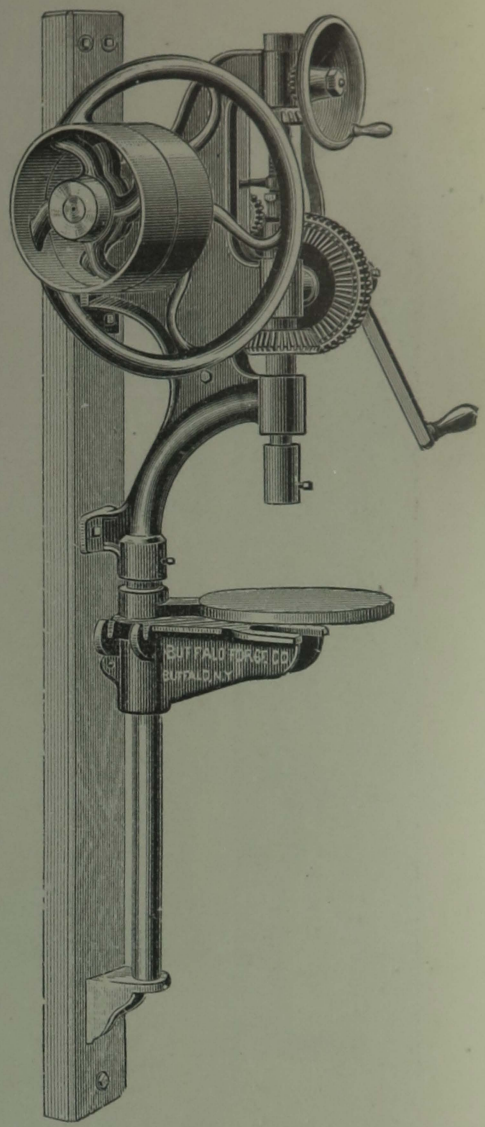
LIST.

Numbers.		Price
"66"	Weight, 100 pounds; length, 37 inches; drills up to 1-inch diameter, and to center of 15-inch circle; automatic feed with run of 3¼ inches, and adjustable for three feeds; two rates of speed; distance from lowest point of table to spindle, 16½ inches; table, 8 inches diameter. Drill is provided with hand wheel for quick return of spindle, and with wrench. Chuck is for ½-inch drill shank	$22 00
67	Same Drill for power, tight and loose pulleys	28 00
71	Length, 44 inches; weight, 125 pounds; drills from ⅛ to 1¼-inch hole, and to center of 11-inch circle; feed has a run of 5 inches and four rates of speed; triple gear. On our triple-geared Drills (Nos. 71 to 74) the speed may be made either fast or slow by changing the handle from front to rear shaft. This feature increases their respective capacities nearly one-third. All chucks are made for ½-inch drill shanks	36 00
71½	Upright Self-feeding Power Drill, with tight and loose pulley	40 00
72	Upright Self-feeding Hand Drill, with Emery Grinder	38 00
72½	Upright Self-feeding Power Drill, Emery Grinder, tight and loose Pulley	42 00

BLACKSMITHS' DRILLS—Continued.



No. 74.



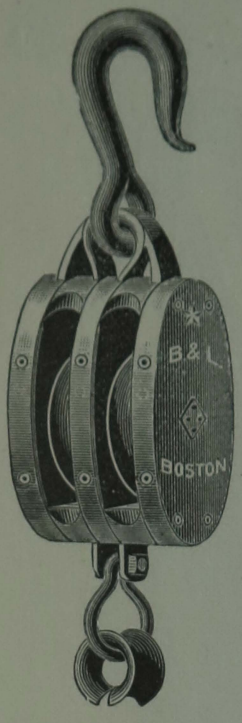
No. 75.

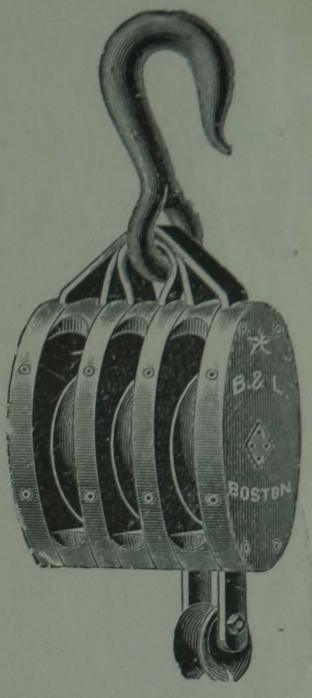
TRIPLE GEARED, WITH AUTOMATIC FEED.

Length, 54 inches; weight, 175 pounds. Drills from ⅛ to 1¼-inch hole, and to center of 15-inch circle. Spindle has a run of 5 inches and four rates of speed. This Drill is designed especially for heavy work, and has the elements of rigidity and strength disposed to the best possible advantage.

LIST.

Numbers.		Price.
73	Upright Self-feeding Drill	$46 00
74	Upright Self-feeding Drill, with Emery Grinder	48 00
75	Hand and Power Machine	52 00
76	Hand and Power Machine, with Emery Wheel	54 00
77	Hand and Power Machine, with Countershaft	66 00
78	Hand and Power Machine, with Countershaft and Emery Wheel	68 00





PATENT HEAVY TACKLE BLOCKS.

Thick Mortise, Double Cross Bolted, with Extra Heavy Straps and Hooks, Loose Hooks, Rings, or Shackels, Lignumvitæ or Iron Sheaves.

LIST.

DIMENSIONS.				PRICE, IRON BUSHED.			PRICE, SELF-ADJUSTING FIVE-ROLLER BUSHED.		
Size Sheave. Inches.	Dia. Rope. Inches.	Size. Inches.	Mortise. Inches.	Single.	Double.	Triple.	Single.	Double.	Triple.
1¾x ½x ⅜	⅜	3	9/16	$ 70	$ 1 30	$ 1 75	$ 1 10	$ 2 00	$ 2 90
2 x ½x ⅜	⅜	3½	9/16	75	1 45	2 00	1 15	2 20	3 15
2¼x ⅝x ⅜	½	4	11/16	85	1 60	2 15	1 20	2 25	3 25
3 x ¾x ⅜	⅝	5	⅞	90	1 75	2 25	1 25	2 35	3 50
3½x1 x ½	¾	6	1	1 10	2 00	2 90	1 50	2 85	4 40
4¼x1 x ½	⅞	7	1⅛	1 30	2 40	3 50	1 70	3 35	5 00
4¾x1⅛x ⅝	1	8	1¼	1 65	2 85	4 25	2 25	4 15	6 00
5½x1⅛x ⅝	1	9	1¼	1 85	3 40	4 75	2 50	4 70	7 25
6¼x1¼x ¾	1⅛	10	1⅜	2 75	4 50	6 25	3 50	6 00	8 50
7¼x1¼x ¾	1⅛	11	1⅜	Same	list as 12	inch.	Same	list as 12	inch.
8 x1⅜x ¾	1¼	12	1½	4 45	7 50	10 65	5 30	9 20	13 20
9 x1½x ¾	1¼	13	1½	Same	list as 14	inch.	Same	list as 14	inch.
9½x1⅝x ¾	1⅜	14	1¾	7 00	10 50	15 00	8 15	12 80	18 45
10 x1⅝x ⅞	1½	15	1¾	8 00	13 00	18 00	9 25	15 50	21 75
11 x1⅝x ⅞	1⅝	16	1⅞	10 00	15 00	22 00	11 50	18 00	26 50

LIST.

DIMENSIONS.			PRICE, METALLINE BUSHED, SELF-LUBRICATING.		
Size Sheave. Inches.	For Diam. Rope. Inches.	Size Shell. Inches.	Single.	Double.	Triple.
4¾ x 1¼ x ⅝	1⅛	8	$ 5 00	$ 9 00	$13 00
5⅜ x 1⅜ x ⅝	1⅛	9	5 75	10 50	15 00
6¼ x 1½ x ¾	1¼	10	7 25	13 50	19 00
7 x 1½ x ¾	1¼	11	Same	list as 12	inch.
8 x 1⅝ x ¾	1½	12	9 25	17 00	25 00
9 x 1¾ x ⅞	1½	13	Same	list as 14	inch.
9½ x 1⅞ x ⅞	1¾	14	13 00	23 50	33 00
10 x 1⅞ x ⅞	1¾	15	15 00	26 50	37 00
11 x 2⅛ x 1	2	16	18 00	32 00	48 00

TACKLE BLOCKS—Continued.

STEEL AND IRON.

LIST.

DIMENSIONS.		PRICE. PLAIN BUSHED.			PRICE. ROLLER BUSHED.			PRICE. SELF-LUB. PHOS. BRONZE BUSHED.		
Length of Shell. Inches.	Diam. of Rope. Inches.	Single.	Double.	Triple.	Single.	Double.	Triple.	Single.	Double.	Triple.
4	½	$ 90	$ 1 75	$ 2 50	.....	.....	.....	$1 65	$ 3 25	$ 4 75
5	⅝	1 00	1 90	2 75	$1 50	$ 2 90	$ 4 25	1 80	3 50	5 15
6	¾	1 25	2 25	3 25	1 75	3 25	4 75	2 10	4 00	5 80
7	⅞	1 50	2 70	4 00	2 10	3 85	5 80	2 45	4 60	6 85
8	1	1 85	3 20	4 75	2 55	4 60	6 85	2 90	5 30	7 90
9	1⅛	2 40	4 00	5 50	3 20	5 60	7 90	3 55	6 30	9 00
10	1¼	3 10	5 10	7 00	4 05	7 00	9 85	4 40	7 70	11 00
12	1⅜	5 00	8 25	11 75	6 00	10 35	14 90	6 45	11 15	16 00
14	1½	7 50	11 75	16 50	8 75	14 25	20 25	9 10	15 00	21 30

All the above blocks are equivalent to wide mortise wooden blocks, giving plenty of room for the rope.

Our plain, roller bushed, and self-lubricating sheaves are interchangeable.

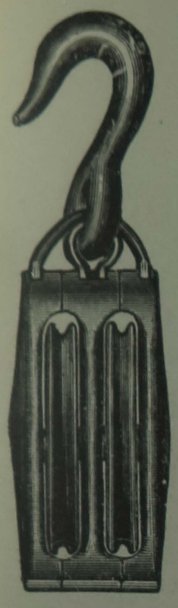
EXTRA HEAVY.

LIST.

DIMENSIONS.		PRICE. PLAIN BUSHED.			PRICE. SELF-LUBRICATING PHOS. BRONZE BRUSHED.		
Length of Shell. Inches.	Diameter of Rope. Inches.	Single.	Double.	Triple.	Single.	Double.	Triple.
12	1½	$ 6 25	$10 25	$15 00	$ 7 85	$13 50	$20 00
14	1¾	9 00	15 00	20 00	10 80	18 50	25 50
16	2	13 00	21 00	32 00	15 00	25 00	38 00

These blocks are designed for heavy work. When fitted with the self-lubricating bushing, they run very easily.

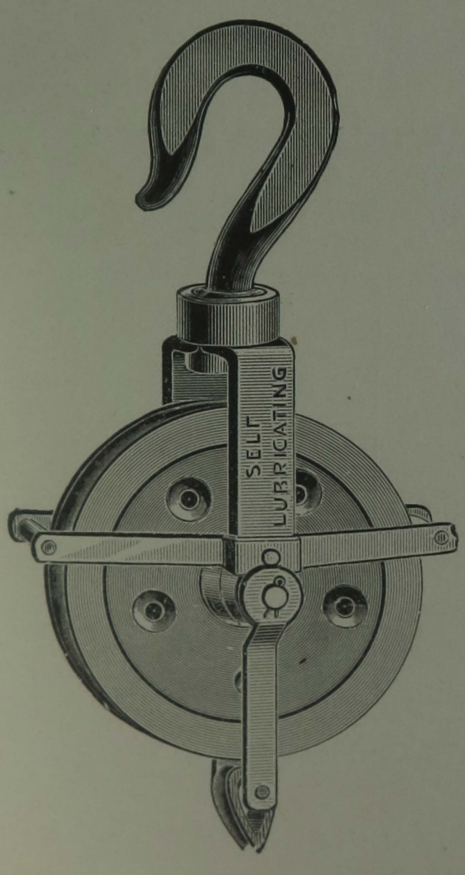
MALLEABLE IRON BLOCKS FOR WIRE ROPE.

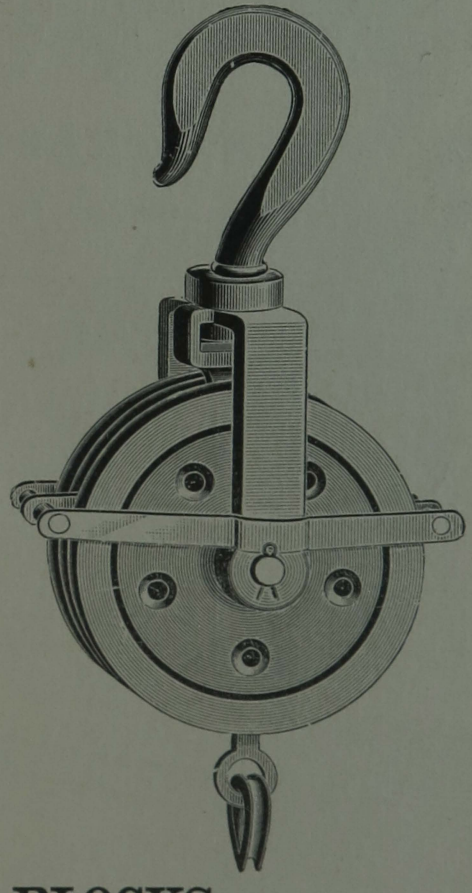


LIST.

Length of Shell. Inches.	Diameter of Sheave. Inches.	Diameter of Rope. Inches.		Price.
14	10	½ to ⅝	Single.....	$ 9 50
			Double ...	17 50
			Triple.	25 50
16	12	⅝ to ¾	Single.....	12 50
			Double.....	23 00
			Triple.....	31 00
18	14	⅞ to 1	Single.....	18 00
			Double....	30 00
			Triple.....	43 50

These Blocks are all fitted with our self-lubricating phos. bronze bushings, and while very strong, are made with special reference to lightness, for ease in handling.





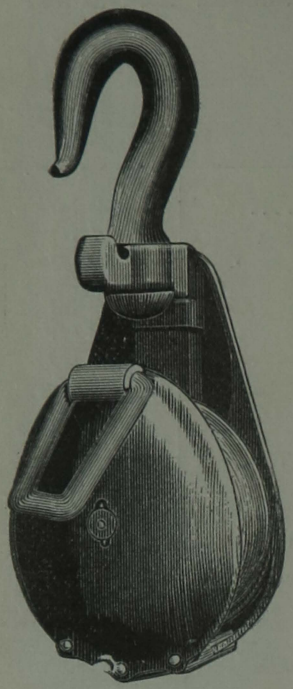
PATENT STEEL BLOCKS.

FOR WIRE ROPE.

LIST.

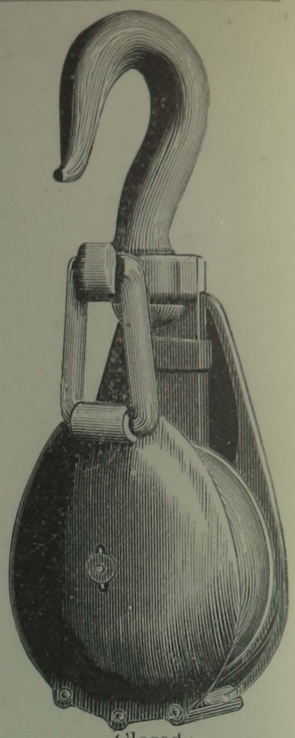
Diameter of Sheave. Inches.	Diameter of Rope. Inches.	Single. Price.	Double. Price.
10	½	$11 00	$18 00
12	⅝	12 50	20 00
14	¾	15 00	23 00
16	⅞	18 00	27 00
18	1	23 00	32 00
20	1⅛	28 00	38 00

These sheaves are all fitted with self-lubricating phos. bronze bushings. These Blocks all have roller guards to keep rope in place.



Open.

NEW STYLE PATENT AUTOMATIC SNATCH BLOCKS.



Closed.

LIST.

Length of Shell. Inches.	Size of Sheave. Inches.	Diameter of Rope. Inches.	Price.
7	3½ x 1¼	¾ to ⅞	$ 5 50
8	4 x 1½	1 to 1⅛	7 00
10	5½ x 1⅞	1¼ to ⅜	9 00
12	7 x 2	1½ to 1⅝	11 50
14	8 x 2¼	1¾ to 1⅞	15 00
16	9 x 2½	2 to 2¼	20 00

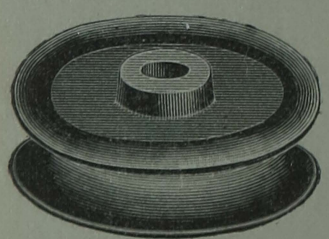
These sheaves are all fitted with self-lubricating brass bushings. We claim for these Snatch Blocks superiority at every point over anything in the world.

IRON STRAPPED SNATCH BLOCKS.

SWIVEL HOOK AND CROSS BOLTED.

LIST.

Size of Sheave. Inches.	For Diameter Rope. Inches.	Size of Shell. Inches.	Self-Lubricating Metalline Bushed.	Iron Bushed.
3 x 1⅛ x ½	⅞	6	$ 5 25	$ 4 00
3½ x 1¼ x ½	⅞	7	6 00	4 75
4½ x 1⅜ x ⅝	1	8	7 25	5 75
5 x 1⅜ x ⅝	1⅛	9	8 50	6 75
5¾ x 1⅞ x ¾	1¼	10	11 00	8 50
6¾ x 2⅛ x ¾	1½	12	13 00	10 00
8 x 2¼ x ⅞	1¾	14	16 50	13 00
9 x 2⅝ x 1	2	16	22 00	17 00
10 x 3 x 1	2¼	18	31 00	25 00
11 x 3½ x 1¼	2½	20	46 00	38 00
11¾ x 4¼ x 1½	3	22	68 00	55 00
12½ x 4½ x 1⅝	3½	24	86 00	70 00



GRAY IRON SHEAVES.

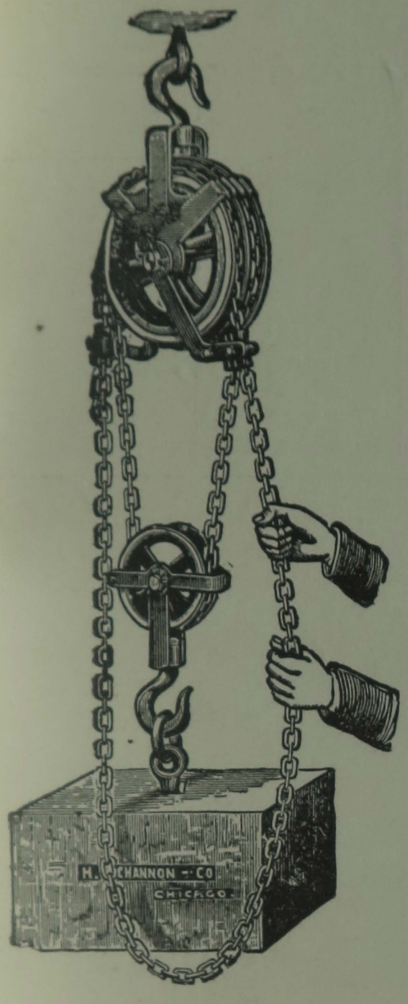
FOR OUR REGULAR BLOCKS.

LIST.

Size of Sheave. Inches.	Size of Block.	Plain Bushed.	Roller Bushed.	Self-Lubr. Phosphor Br'nze Bus.	Size of Sheave. Inches.	Size of Block.	Plain Bushed.	Roller Bushed	Self-Lubr. Phosphor Br'nze Bus.
2¼x 11/16	4-inch Regular	$ 13	.....	$ 90	7½x1¾	12-inch W. M..	$1 15	.....	$2 75
2¾x⅞	5-inch Regular	15	$ 65	95	9 x1⅞	14-inch W. M..	1 40	.....	3 00
3½x1	6-inch Regular	25	75	1 10	10 x2¼	16-inch W. M..	2 40	.....	4 40
4¼x1⅛	7-inch Regular	33	90	1 30	3½x1¼	7-inch Snatch.	28	.....	1 25
5 x1¼	8-inch Regular	40	1 10	1 45	4 x1½	8-inch Snatch.	35	.....	1 50
5½x1 5/16	9-inch Regular	50	1 30	1 65	5½x1⅞	10-inch Snatch.	70	.....	2 00
6¼x1⅜	10-inch Regular	65	1 60	1 95	7 x2	12-inch Snatch.	1 10	.....	2 90
7½x1½	12-inch Regular	95	2 00	2 40	8 x2¼	14-inch Snatch.	1 65	.....	3 40
8½x1⅝	14-inch Regular	1 25	2 50	2 85	9 x2½	16-inch Snatch.	2 25	.	4 25

IMPROVED WESTON DIFFERENTIAL PULLEY BLOCKS.

WITH GUIDE.



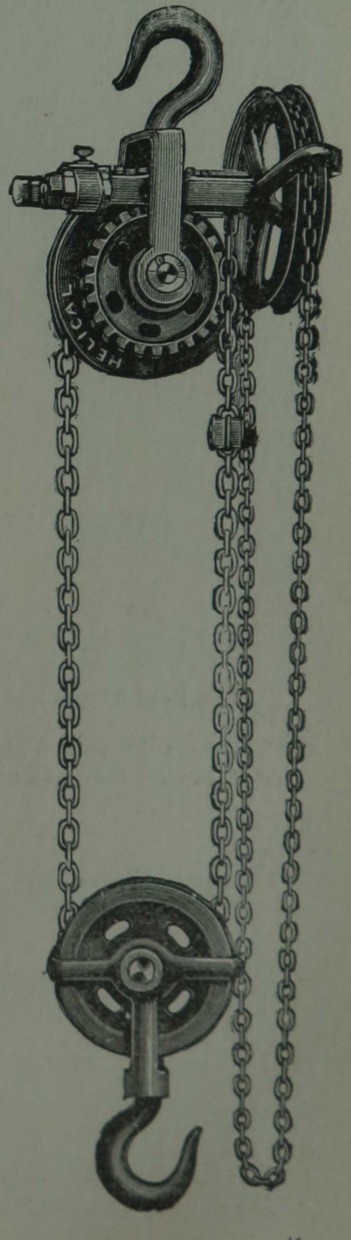
The cut shows an improved pattern of the well-known Weston Block, occupying less space than the old style, but retaining its great power and its feature of holding the load suspended at any point. It is fitted with patent chain guides, which prevent the troublesome locking of chains. This arrangement also enables the Block to be used either horizontally or at any desired angle.

LIST.

Capacity. Tons.	Regular Chain in Block. Feet.	Will Lift. Feet.	Extra Chain. Per Foot.	Price. Complete.
¼	22	6	$0 36	$13 00
½	26	7	38	15 00
1	30	8	40	20 00
1½	33	8½	42	25 00
2	36	9	44	30 00
3	38	10	48	40 00
5	..	..	..	90 00

The length of the chain required is about four times the height of lift.

GEARED PULLEY BLOCKS.



One man can lift from 2000 to 5000 pounds.

They hold the load at any point, and cannot run down.

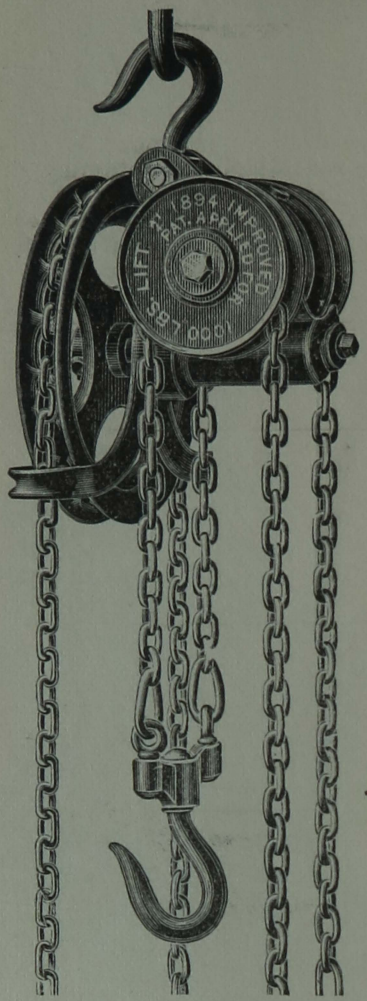
Easy and smooth in action—light and convenient to handle.

LIST.

Capacity. Tons.	CHAINS. REGULAR LENGTHS. Feet.		Hoist, Feet. See Note*	Net Weight, Complete. Pounds.	Price of Extra Main Chain. Per Foot.	Price, Complete, With Chains, Regular Lengths. Boxed.
	Main Chain.	Hand Chain.				
1	22	16	8	62	$ 40	$ 35 00
2	24	18	9	109	44	45 00
3	26	20	10	159	48	60 00
4	28	22	11	257	54	80 00
5	30	24	12	324	60	110 00
6	32	26	13	493	70	150 00
8	36	28	14	735	85	210 00
0	40	30	16	1054	1 00	275 00

EXTRA LENGTHS OF CHAINS.

For each foot of extra hoist allow 2½ feet of main chain, and 2 feet of hand chain.

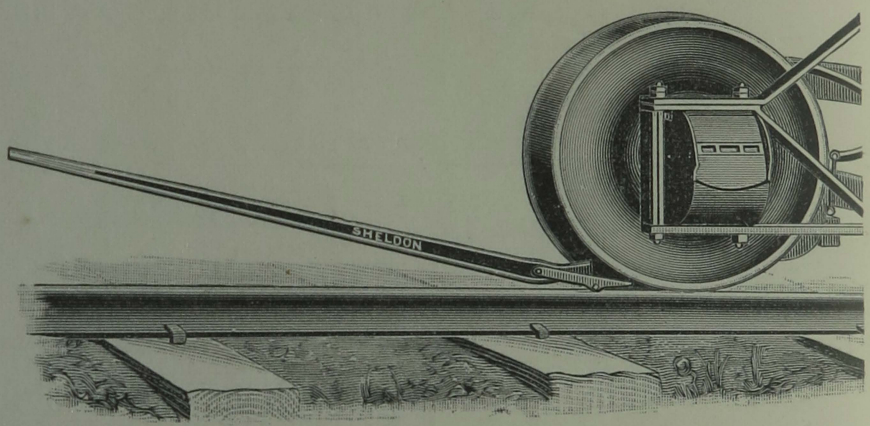


HARRINGTON HOISTS.

DOUBLE CHAIN SCREW HOISTING MACHINE.

LIST.

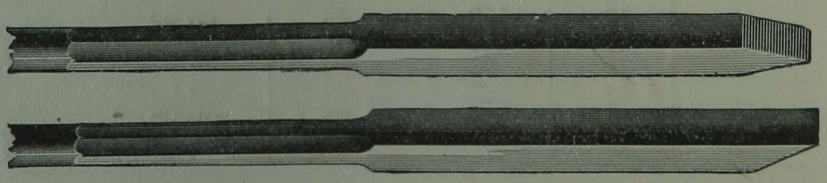
Weight. Pounds.	Lift. Feet.	To Raise. Pounds.	Price.	Extra Lift. Per Foot.
35	8	500	$ 22 50	$1 00
52	8	1000	25 00	1 20
65	8	2000	30 00	1 50
76	8	3000	40 00	1 75
140	9	4000	55 00	2 00
226	10	6000	75 00	2 20
258	10	8000	95 00	2 40
625	12	10000	140 00	3 00
750	12	12000	180 00	3 75
875	12	16000	260 00	4 75
925	12	20000	340 00	6 00



THE "SHELDON" COMPOUND LEVER PINCH BAR.

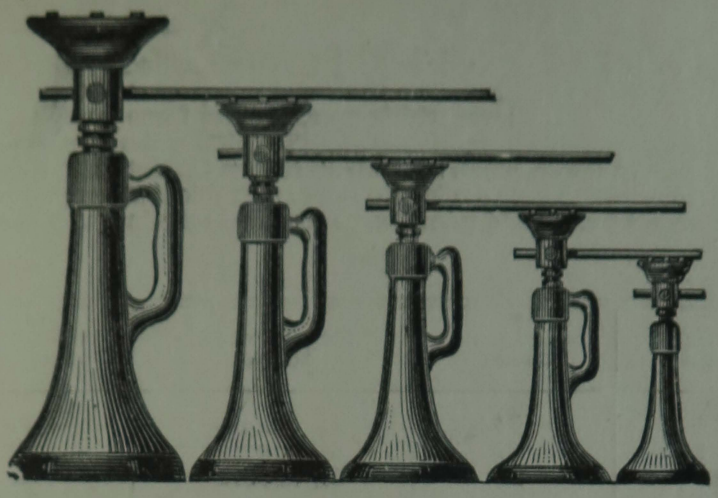
The handle is made of malleable iron, the toe plates and heels are of steel and interchangeable.
Every wearing part is protected by a hardened tool steel plate which is removable.
The heel is reversible four times and when worn out can be replaced by a new one.

Price of bar, including one heel $5 00
Price of heels—made of choicest steel..... Each, 25



STEEL CROW BARS.

Number.				
1	1 x 45 inches, painted.....	$1 00;	finished bright.....	$4 00
	1⅛ x 55 inches, painted.....	1 50;	finished bright.....	5 00



LOCOMOTIVE AND CAR JACK SCREWS.

LIST.

Diameter of Screw. Inches.	Height of Stand. Inches.	Height Over All. Inches.	Price.	Diameter of Screw. Inches.	Height of Stand. Inches.	Height Over All. Inches.	Price.
1¼	4	6½	$ 3 25	2	24	28	$13 50
1¼	6	9	3 50	2¼	6	10½	7 00
1¼	8	11	3 75	2¼	8	12½	7 50
1¼	10	13	4 25	2¼	10	14½	8 25
1½	4	7	3 50	2¼	12	16½	9 00
1½	6	9½	3 75	2¼	14	18½	10 00
1½	8	11½	4 25	2¼	16	20½	11 00
1½	10	13½	4 75	2¼	18	22½	12 00
1½	12	15½	5 25	2¼	20	24½	13 25
1½	14	17½	6 00	2¼	22	26½	14 50
1½	16	19½	6 75	2¼	24	28½	15 75
1¾	6	10	4 50	2½	6	11	8 00
1¾	8	12	5 00	2½	8	13	8 75
1¾	10	14	5 75	2½	9	14	9 25
1¾	12	16	6 25	2½	10	15	9 75
1¾	14	18	6 75	2½	12	17	10 75
1¾	16	20	7 50	2½	14	19	12 00
1¾	18	22	8 50	2½	16	21	13 25
2	6	10	5 25	2½	18	23	14 50
2	8	12	6 00	2½	20	25	15 75
2	10	14	6 75	2½	22	27	17 00
2	12	16	7 50	2½	24	29	18 25
2	14	18	8 25	3	18	23	24 00
2	16	20	9 25	3	20	25	25 50
2	18	22	10 25	3	24	29	27 00
2	20	24	11 50	...	..	....	.....

"JOYCE" PATENT LEVER JACKS.

LIST.

Numbers.	Height of Jack when bar is down Inches.	Rise of Bar. Inches.	Size of Bar. Square Inches.	Weight of Jack Pounds	Capacity. Tons.	Price.	Numbers.	Height of Jack when bar is down Inches.	Rise of Bar. Inches.	Size of Bar. Square Inches.	Weight of Jack Pounds	Capacity. Tons.	Price.
1A	16	9	1¼	25	½	$ 7 00	4	23	14	1½	42	4	$16 00
2A	19	11	1¼	25	½	7 00	5	28¾	15	1¾	75	8	23 00
4A	23	14	1½	42	1	12 00	5a	24	10	1¾	70	8	23 00
1	16	9	1¼	25	2	10 00	6	28	15	2	95	15	26 00
2	19	11	1¼	25	2	10 00	7	37½	25	2	118	15	30 00
3	12	4	1½	28	4	10 00	..	....	..	...	...	..	.....
TOGGLE TRIP JACKS FOR TRACK USE.													
38	26	13	1½	65	4	$18 00	39	29	15	1¾	75	8	$23 00

DUDGEON'S IMPROVED HYDRAULIC JACKS.

This Jack appears to the eye when depressed a simple cylinder, with a base and head, when elevated one cylinder sliding within another. To the inner one (which is termed the ram) is attached the head having a socket to receive the lever which operates the force pump in the lower end of ram; the remaining space is the reservoir containing the liquid which when forced into the lower chamber causes the ram to rise, and to lower, when allowed to return through the lower valve and back passages operated by the same lever. These Jacks are light, portable and easy of application, worked by one man who can lift 10 tons, 1 foot in 1½ minutes, or 20 tons in 3 minutes, and so on proportionately.

LIST.

	Tons Lift.	Run Out. Inches.	Height. Inches.	Size of Bottom. Inches.	Weight. Pounds.	Price.
PLAIN JACKS.	4	12	24	4 square	46	$ 60 00
	4	24	37	4 square	60	65 00
	7	12	25	4½ square	64	70 00
	7	18	32	4½ square	72	73 00
	7	24	38	4½ square	80	75 00
	10	12	25	6 square	80	80 00
	10	18	32	6 square	98	95 00
	10	24	39	6 square	110	110 00
	15	12	26	6½ square	102	100 00
	15	18	32	6½ square	120	125 00
	15	24	39	6½ square	140	150 00
	20	12	26	7 square	127	120 00
	20	18	33	7 square	155	145 00
	20	24	39	7 square	180	170 00
	30	9	22	8 round	146	150 00
	30	12	26	8 round	194	175 00
	30	18	33	8 round	260	210 00
	40	12	27	9 round	280	210 00
	40	18	34	9 round	320	250 00
BASE JACKS.	4	12	23	9½ round	61	60 00
	4	24	37	9½ round	80	65 00
	7	12	25	10 round	82	80 00
	7	18	31	10 round	100	85 00
	7	24	38	10 round	120	90 00
	10	12	25	11 round	109	95 00
	10	18	31	11 round	125	110 00
	10	24	39	11 round	145	125 00
	15	12	25	12 round	135	125 00
	15	18	32	12 round	158	150 00
	15	24	39	12 round	176	175 00
	20	12	26	13 round	169	150 00
	20	18	33	13 round	198	175 00
	20	24	39	13 round	228	200 00
	30	9	22	14 round	210	170 00
	30	12	26	14 round	259	200 00
	30	18	33	14 round	300	235 00
	40	12	27	14½ round	320	240 00
	40	18	33	14½ round	360	280 00
CLAW OR GROUND LIFTING JACKS.	4	12	24	4 square	64	60 00
	4	24	37	4 square	94	65 00
	7	12	25	4½ square	90	85 00
	7	18	31	4½ square	110	88 00
	7	24	38	4½ square	123	90 00
	10	12	25	6 square	123	100 00
	10	18	32	6 square	144	120 00
	10	24	39	6 square	170	145 00
	15	12	26	6½ square	162	150 00
	15	18	32	6½ square	189	185 00
	20	12	26	7 square	207	200 00
	20	18	33	7 square	245	240 00
	30	12	26	8 round	310	250 00

SPECIAL SIZES TO ORDER.

The ground lifting attachment is a tube screwed into the underside of the head; on the lower end is a claw to support the weight to be raised.

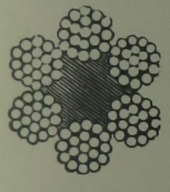
WIRE ROPE

CRUCIBLE CAST STEEL HOISTING ROPES.

NINETEEN WIRES TO STRAND. HEMP CENTERS.

LIST.

Diameter. Inches	Breaking Strain in Tons of 2000 Pounds.	Diameter of Hemp Rope of Equal Strength.	Proper Working Load in Tons of 2000 Pounds.	Average Weight Per Foot.	Price per Foot. Cents.	Diameter. Inches.	Breaking Strain in Tons of 2000 Pounds.	Diameter of Hemp Rope of Equal Strength.	Proper Working Load in Tons of 2000 Pounds.	Average Weight Per Foot.	Price per Foot. Cents.
7/16	6	1¼	¾	.29	6½	1¼	52	3¾	9	2.50	30
½	7½	1½	1	.35	7	1⅜	63	4	10	3.00	36
9/16	9	1 9/16	1¼	.45	8	1½	77	4¼	12	3.65	43
⅝	14½	1¾	2	.70	9	1⅝	86	4¾	15	4.10	48
¾	18	2⅛	3	.90	11½	1¾	106	5¼	18	5.25	60
⅞	25	2⅝	4	1 20	15	2	125	...	25	6.30	72
1	33	3	5	1 60	19	2¼	160	...	30	8.00	92
1⅛	42	3⅜	7	2 00	25	...	...	...	..	....	..



SWEDES IRON PLIABLE HOISTING ROPES.

NINETEEN WIRES TO STRAND. HEMP CENTERS.

LIST.

Diameter. Inches.	Breaking Strain in Tons of 2000 Pounds.	Diameter of Hemp Rope of Equal Strength.	Proper Working Load in Tons of 2000 Pounds.	Average Weight Per Foot.	Price per Foot. Cents.	Diameter. Inches.	Breaking Strain in Tons of 2000 Pounds.	Diameter of Hemp Rope of Equal Strength.	Proper Working Load in Tons of 2000 Pounds.	Average Weight Per Foot.	Price per Foot. Cents.
⅜	2.50	⅞	¼	.26	4½	1¼	27.	3⅛	5½	2.50	26
7/16	3 10	1	⅜	.29	4¾	1⅜	33.	3¼	6½	3.00	31
½	3.50	1⅛	½	.35	5	1½	39.	3½	8	3.65	37
9/16	4.30	1 5/16	¾	.44	6½	1⅝	44.	4	9	4.10	41
⅝	5.25	1½	1¼	.70	7½	1¾	54.	4¼	11	5.25	52
¾	8.75	1⅝	1¾	.88	10	2	65.	4¾	13	6 30	60
⅞	11.50	2	2½	1.20	12	2¼	74.	5⅛	15	8.00	76
1	16.	2¼	3	1.58	16	2½	82.	...	..	10 40	..
1⅛	20.	2⅝	4	2.00	21	...	. .	...	..	.....	..

TILLER ROPES.

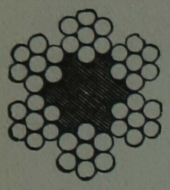
IRON BRIGHT.

LIST.

Size.....Inches,	¼	5/16	⅜	7/16	½	9/16	⅝	¾	⅞	1
Price.....Per foot,	$0 04½	0 05	0 06	0 06½	0 07	0 09	0 11	0 14	0 17	0 21

Tiller Ropes are used as hand ropes on store elevators and hoists.

They are made similar to hawser laid ropes (more properly cable laid), viz: Six small standing ropes are laid around a hemp heart, thus forming a rope of 252 wires. Tiller ropes are the most flexible of all ropes.



CRUCIBLE CAST STEEL TRANSMISSION AND STANDING ROPES.

SEVEN WIRES TO STRAND, HEMP CENTERS.

LIST.

Diameter. Inches.	Breaking Strain in in Tons of 2,000 Pounds.	Proper Working Load in Tons of 2,000 Pounds.	Average Weight Per Foot.	Price per Foot. Cents.
5/16	3	3/4	.16	2 3/4
3/8	4	1	.20	3 1/4
7/16	5	1	.28	4
1/2	7	1 1/4	.35	4 3/4
9/16	9	1 3/4	.44	5 1/2
5/8	11 1/2	2	.65	7
11/16	14	3	.70	8 1/2
3/4	17	3 1/2	.88	10
7/8	22	4 1/2	1.20	14
1	30	6	1.50	18
1 1/8	36	7	2.00	23
1 1/4	44	9	2 44	28
1 3/8	52	10	3.00	33
1 1/2	62	13	3.65	39

These ropes are principally used for derricks, guys, steamboat rigging, ferries, transmission of power, etc.

POWER STEEL PLIABLE HOISTING ROPES.

NINETEEN WIRES TO THE STRAND, HEMP CENTERS.

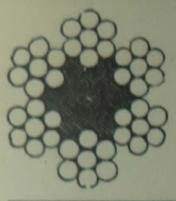
LIST.

Diameter. Inches.	Breaking Strain in Tons of 2,000 Pounds.	Proper Working Load in Tons of 2,000 Pounds.	Average Weight Per Foot.	Minimum Size of Drums or Sheaves in Feet.	Price per Foot. Cents.
3/8	8	1 1/2	.23	3	8
7/16	10	2	.29	4	8 1/2
1/2	13	2 1/2	.39	5	9
9/16	15	3	.48	5 1/2	10 1/2
5/8	20	4	.65	6	12 1/2
3/4	30	6	.88	7 1/2	16 1/2
7/8	40	8	1.20	7 1/2	22
1	50	10	1.58	8	28
1 1/8	63	12	2 00	9	34
1 1/4	76	15	2.50	10	41
1 3/8	95	19	3 00	11 1/2	50
1 1/2	115	23	3.65	12 1/2	60
1 5/8	130	26	4.10	14	70
1 3/4	160	32	5.25	15	87
2	220	44	6.30	18	104
2 1/4	235	47	8.00	22	130

N. B.—When made with wire center, the price per foot is *ten per cent. extra.*

The wire ropes mentioned in the above table are made of six strands of nineteen wires each, laid around a hemp center, thus having 114 wires in all.

We wish to call especial attention to these ropes. The wires are drawn from a patent steel, and are the strongest and toughest that human ingenuity can make. High tensile strength is not their only recommendation, but they also possess, in the highest degree, *uniformity of strength, density, elasticity and elongation.*

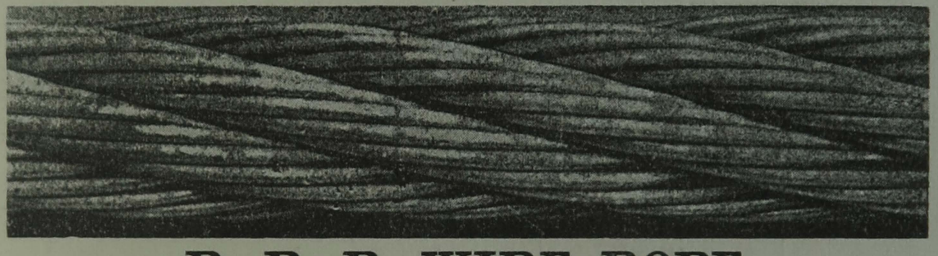


GALVANIZED "CHARCOAL" IRON WIRE ROPES.

FOR SHIPS' RIGGING, STAYS, GUYS, ETC.

LIST.

Diameter. Inches.	Circum. Inches.	Weight Per Foot. Pounds.	Breaking Strain in Tons of 2000 Pounds.	Circum of Hemp Rope. Equal Strength. Inches.	7 Wires Coarse Laid, Price Per Foot.	12 Wires Fine Laid, Price Per Foot.	Diameter. Inches.	Circum. Inches.	Weight Per Foot. Pounds.	Breaking Strain in Tons of 2000 Pounds.	Circum. of Hemp Rope. Equal Strength. Inches.	7 Wires Coarse Laid, Price Per Foot.	12 Wires Fine Laid, Price Per Foot.
1 7/8	5 1/2	4.42	43	11	$0 26	$0 27	1 3/16	2 1/2	.92	9	$0 05	5 3/4	....
1 3/4	5 1/4	4.08	40	10 1/2	24	25	3/4	2 1/4	.75	8	04 1/2	5	....
1 5/8	5	3.67	35	10	22	23 1/2	5/8	2	.59	7	04 1/4	4 1/4	....
1 9/16	4 3/4	3.50	33	9 1/2	20	22	9/16	1 3/4	.42	5	04	3 1/2	....
1 1/2	4 1/2	3.17	30	9	18	20	1/2	1 1/2	.34	3 1/2	03 1/2	3	....
1 3/8	4 1/4	2.75	26	8 1/2	16	17 1/4	7/16	1 1/4	.30	2 1/2	03	2 3/4	....
1 5/16	4	2.38	23	8	14	15	3/8	1 1/8	.22	2 1/4	02 5/8	2	....
1 1/4	3 3/4	2 13	20	7 1/2	12 1/4	13 1/2	5/16	1	.14 1/2	2	02 1/2	1 1/2	....
1 1/8	3 1/2	1.79	16	7	10 1/2	11 3/4	9/32	7/8	.10 1/2	1 1/2	02	1 1/4	....
1 1/16	3 1/4	1 58	14	6 1/2	09 1/2	10 1/4	1/4	3/4	.08	3/4	01 1/2	1	....
1	3	1.33	12	6	08	08 3/4	7/32	5/8	.05	5/8	01 1/4	7/8	....
7/8	2 3/4	1.13	10	5 1/2	06 3/4	....	3/16	1/2	.04	3/8	01 1/8	3/4	....



B. B. B. WIRE ROPE.

IN CRUCIBLE AND BESSEMER STEEL.

PRICES ON APPLICATION.

GALVANIZED STRAND OR GUY ROD.

FOR GUYS, SIGNAL CORD, FENCING AND ELECTRIC LIGHT PLANTS.

LIST.

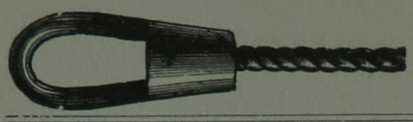
Seven Wires. Numbers.	Approximate Diameter. Inches.	Weight per 100 Feet. Pounds.	Strength. Pounds.	Price per 100 Feet.	Seven Wires. Numbers.	Approximate Diameter. Inches.	Weight per 100 Feet. Pounds.	Strength Pounds.	Price per 100 Feet.
8	1/2	52	8320	$ 4 00	15	1/4	10	1600	$ 1 00
9	15/32	42	6720	3 40	16	7/32	8	1280	90
10	7/16	36	5720	3 00	17	3/16	6	960	70
11	3/8	29	4640	2 45	18	11/64	4 3/10	688	52
12	5/16	21	3360	1 90	19	9/64	3 3/10	528	43
13	9/32	16	2560	1 50	20	1/8	2 4/10	384	33
14	17/64	12	1920	1 15	21	3/32	2	320	30

WIRE SASH AND BELL CORDS.

COPPER, IRON, TINNED AND GALVANIZED.

LIST.

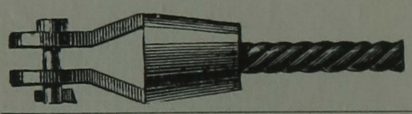
Diameter. Inches.	Price Per Foot in Cents.			Diameter. Inches.	Price Per Foot in Cents.		
	Iron.	Tinned and Galvanized.	Copper.		Iron.	Tinned and Galvanized.	Copper.
1/4	2	2 3/4	6	1/8	1	1 1/4	2 1/2
7/32	1 3/4	2 1/4	5	1/16	3/4	1	1 3/4
3/16	1 1/4	1 3/4	3 1/2	....	..	....	....



CLOSED SOCKETS.

LIST.

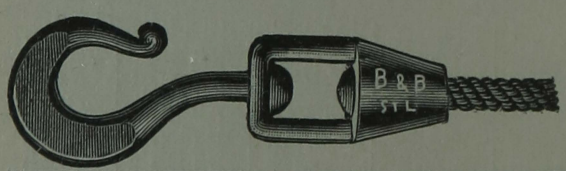
DIAMETER OF ROPE. Inches.	For Cast Steel Ropes.		For Iron, Bessemer or Galvanized Ropes.	
	Loose.	Fastened.	Loose.	Fastened.
2¼	$14 25	$16 50	$11 25	$13 50
2	12 50	14 25	9 00	11 00
1¾	10 75	12 50	7 50	9 25
1⅝	9 00	10 50	6 00	7 50
1½	7 50	9 00	4 50	6 00
1⅜	6 00	7 25	3 25	4 50
1¼	4 50	5 75	2 75	4 00
1⅛	3 25	4 50	2 25	3 50
1	2 75	3 75	2 00	3 00
⅞	2 25	3 25	1 50	2 50
¾	1 85	2 75	1 20	2 10
⅝	1 50	2 25	1 00	1 75
½	1 20	1 80	85	1 50
⅜	1 15	1 60	75	1 20



OPEN SOCKETS.

LIST.

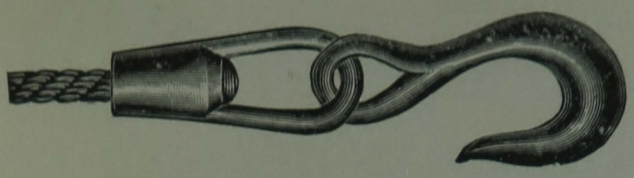
DIAMETER OF ROPE. Inches.	For Cast Steel Ropes.		For Iron, Bessemer or Galvanized Ropes.	
	Loose.	Fastened.	Loose.	Fastened.
2¼	$16 50	$19 00	$12 50	$15 00
2	14 25	16 25	10 50	12 50
1¾	12 50	14 00	9 00	10 50
1⅝	10 50	12 00	7 25	8 75
1½	8 75	10 25	5 50	7 00
1⅜	7 25	8 50	4 00	5 25
1¼	5 50	6 50	3 25	4 25
1⅛	4 00	5 00	3 00	4 00
1	3 25	4 25	2 50	3 50
⅞	2 75	3 75	2 00	3 00
¾	2 50	3 40	1 75	2 60
⅝	2 00	2 75	1 50	2 25
½	1 70	2 30	1 35	2 00
⅜	1 50	2 00	1 20	1 65



SOCKETS WITH SWIVEL HOOKS.

LIST.

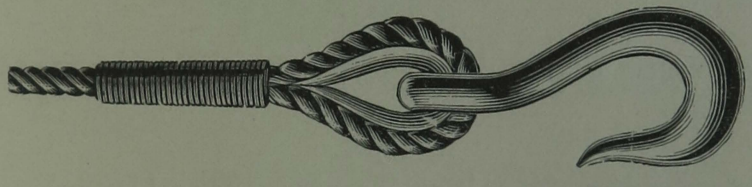
DIAMETER OF ROPE. Inches.	For Cast Steel Ropes.		For Iron, Bessemer or Galvanized Ropes.	
	Loose.	Fastened.	Loose.	Fastened.
2¼	$19 50	$21 75	$16 00	$18 25
2	17 50	19 50	14 25	16 25
1¾	15 50	17 00	12 00	14 00
1⅝	12 75	14 25	9 50	11 00
1½	9 75	11 25	6 75	8 25
1⅜	8 25	9 50	5 50	6 75
1¼	6 50	7 50	4 50	5 50
1⅛	5 25	6 25	4 25	5 25
1	4 50	5 50	3 75	4 75
⅞	4 25	5 15	3 35	4 25
¾	3 75	4 65	3 05	4 00
⅝	3 35	4 15	2 90	3 70
½	3 00	3 60	2 65	3 25
⅜	2 65	3 10	2 25	2 70



HOOKS AND SOCKETS.

LIST.

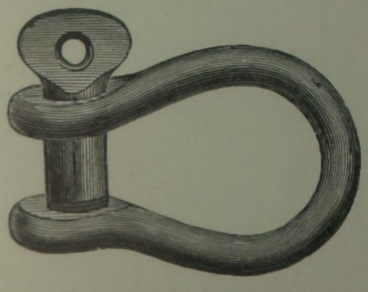
DIAMETER OF ROPE. Inches.	For Cast Steel Ropes.		For Iron, Bessemer or Galvanized Ropes.	
	Loose.	Fastened.	Loose.	Fastened.
1¼	$6 25	$7 25	$4 30	$5 30
1⅛	5 00	6 00	3 75	4 75
1	4 15	5 10	3 20	4 15
⅞	3 55	4 50	2 75	3 70
¾	3 05	3 85	2 30	3 10
⅝	2 65	3 40	2 00	2 75
½	2 55	3 10	1 90	2 45
⅜	1 90	2 45	1 50	2 05



HOOKS AND THIMBLES.

LIST.

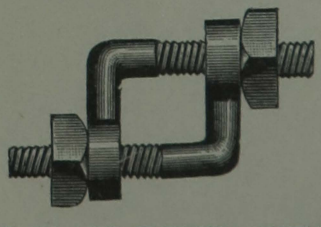
DIAMETER OF ROPE. Inches.	For Cast Steel Ropes.		For Iron, Bessemer or Galvanized Ropes.	
	Loose.	Fastened.	Loose.	Fastened.
1¼	$3 00	$5 25	$2 55	$4 50
1⅛	2 50	4 35	1 90	3 60
1	1 90	3 75	1 50	3 00
⅞	1 50	3 25	1 30	2 65
¾	1 30	2 80	1 15	2 25
⅝	1 20	2 50	1 00	2 00
½	95	2 10	90	1 80
⅜	80	1 70	75	1 40



WIRE ROPE SHACKLES.

LIST.

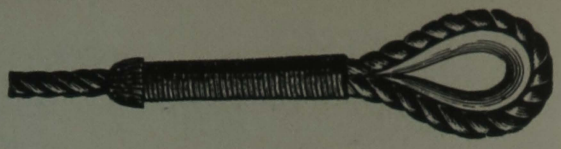
Thickness of Iron...Inches,	¾	⅞	1	1¼
Price.....Each,	$1 40	1 80	2 20	3 15



WIRE ROPE CLIPS.

LIST.

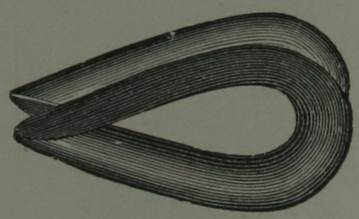
Size. Inches,	⅜	½	⅝	¾	⅞	1	1⅛	1¼
Price..Each,	$0 10	13	16	20	22	25	32	40



THIMBLES SPLICED IN.

LIST.

DIAMETER OF ROPE. Inches.	For Cast Steel Rope.	For Iron, Bessemer or Galvanized Rope.
1¼	$3 60	$3 00
1⅛	2 65	2 25
1	2 25	1 90
⅞	1 90	1 60
¾	1 60	1 30
⅝	1 35	1 15
½	1 20	1 00
⅜	1 05	85

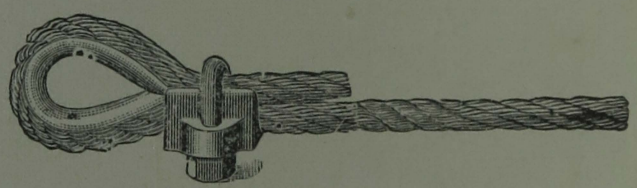


EXTRA HEAVY WIRE ROPE THIMBLES.

GALVANIZED.

LIST.

For Size Rope.....Inches,	¼	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	1⅝
Price.....Each,	$0 08	0 08	0 09	0 11	0 12	0 12	0 14	0 15	0 19	0 22	0 26	0 30

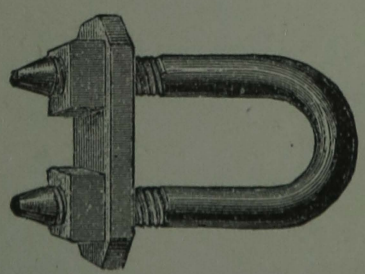


THE "CROSBY" WIRE ROPE CLIPS.

LIST.

Size.....Inches,	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½
Price.....Each,	$0 25	0 30	0 35	0 40	0 45	0 50	0 50	0 50	0 55	0 60

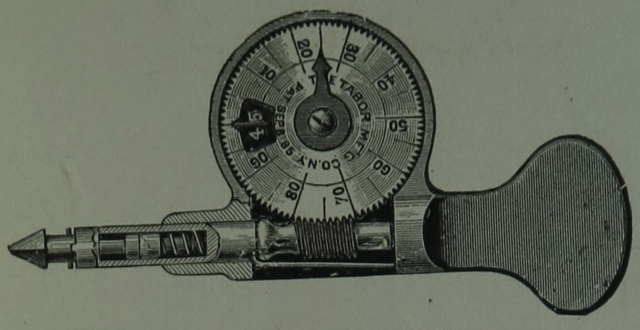
They will not slip nor break. They are light and durable. They are the most effective fastenings in the market.



WIRE ROPE "U" BOLTS.

LIST.

Size.....Inches,	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½
Price.....Each,	$0 25	0 30	0 35	0 40	0 45	....	....	....	....	....



SPEED INDICATORS.

NICKEL PLATED.

Price.....Each, $1 50

REVOLUTION COUNTERS.

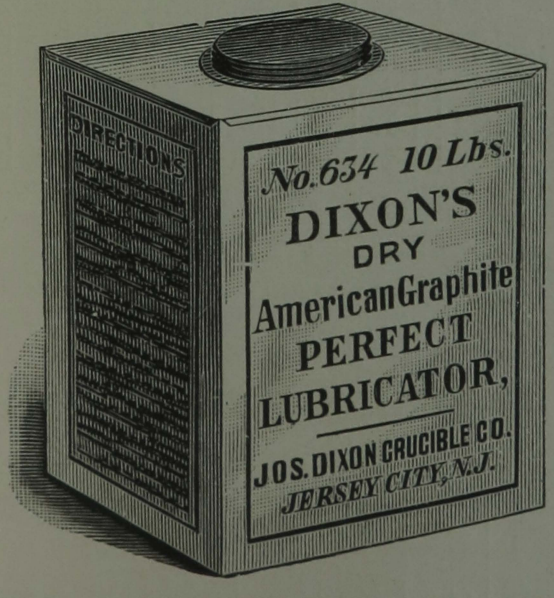
SQUARE CASES, BRASS.

LIST.

4 Figures, size 4½ x 1¾ inches	Each,	$13 50
5 Figures, size 5 x 1¾ inches	Each,	16 00
6 Figures, size 5½ x 1¾ inches	Each,	20 00
7 Figures, size 6 x 1¾ inches	Each,	24 00
4 Figures, size 7 x 2½ inches	Each,	20 00
5 Figures, size 8 x 2½ inches	Each,	24 00
6 Figures, size 9 x 2½ inches	Each,	28 00
7 Figures, size 10 x 2½ inches	Each,	32 00

ROUND CASES, BRASS.

6 Figures, 6¾ inch dial	Each,	$ 60 00
6 Figures, 8½ inch dial	Each,	70 00
6 Figures, 10 inch dial	Each,	85 00
6 Figures, 12 inch dial	Each,	100 00
8 Figures, 8½ inch dial	Each,	80 00
8 Figures, 10 inch dial	Each,	95 00
8 Figures, 12 inch dial	Each,	110 00



DIXON'S AMERICAN GRAPHITE.

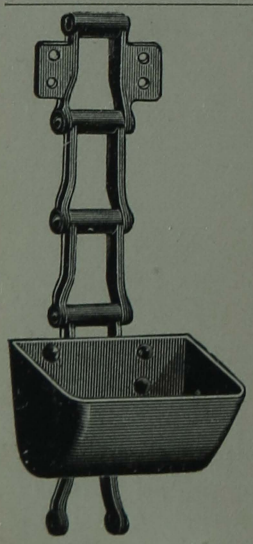
Dixon's American Graphite is a thin flake of graphite of extraordinary properties. It has unrivaled smoothness and endurance. As a lubricant it is superior to either oil or grease.

Price, in five or ten pound cans.....Per pound, $0 25

EXTRA HEAVY "ACME" STEEL ELEVATOR BUCKETS.

LIST.

Width. Inches.	Projection Inches.	Gauge No.	Price.	Gauge No.	Price.	Gauge No.	Price.	Gauge No.	Price.	Gauge No.	Price.	Gauge No.	Price.	Gauge No.	Price.	Gauge No.	Price.
2	2	25	$ 05	....	.....		.....	....	.....	..	.....	....	....	..	.....	....	.....
2½	2¼	24	05	....	.....	....	.....	....	.....	....	....	....	.....	....	.....	..	.....
3	2½	24	06	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....
3½	2½	24	06	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....
3	3	23	07	...	.....	....	.....	....	.....	....	....	..	.....	....		....	.....
3½	3	23	07	....	.....	....	.....	....	.....	....	.....	..	.....	....	.....	....	.....
4	3	23	08	18	$ 20	....		14	$ 36	..	.....	....	.....	....	.....	....	.....
4½	3	23	08	18	20	....	.....	14	36	....	.....	....	..	....	.	..	.
4	3½	22	09	18	21	....	.....	14	38	....	....	....	....	.	.....	....	.....
4½	3½	22	10	18	21	....	.....	14	39	..	.....	..	.....	....	.....	....	.....
5	3½	22	10	18	22	..	.....	14	40	....	.....	....	..	....	.....	....	.....
5	4	22	11	18	24	....	.....	14	42	12	$ 50	10	$ 58	....	.....	..	.....
5½	4	21	12	18	25	....	.....	14	43	12	51	10	60	...	.....	..	.....
6	4	21	12	18	25	....	.....	14	43	12	51	10	60	....	.....	....	.....
7	4½	20	16	18	35	....	.....	14	47	12	59	10	69	8	$ 85	6	$ 97
8	5	19	20	....	.....	16	$ 43	14	52	12	68	10	81	8	96	6	1 10
9	5	19	23	....	....	16	44	14	55	12	69	10	82	8	97	6	1 11
10	5½	19	29	....	....	16	53	14	63	12	79	10	94	8	1 12	6	1 27
10	6	18	39	...	....	16	57	14	68	12	84	10	1 01	8	1 21	6	1 38
11	6	18	39	....	.....	16	57	14	68	12	84	10	1 01	8	1 21	6	1 38
12	6	18	40	....	.....	16	58	14	69	12	86	10	1 03	8	1 24	6	1 41
14	6	18	47	....	.....	16	67	14	78	12	96	10	1 15	8	1 39	6	1 59
16	6	18	48	....	.....	16	71	14	83	12	1 04	10	1 21	8	1 46	6	1 66
18	6	18	60	..	.....	16	74	14	86	12	1 16	10	1 38	8	1 64	6	1 85
20	6	18	65	....	.....	16	77	14	90	12	1 21	10	1 43	8	1 71	6	1 93
10	7	18	40	....	.....	16	60	14	72	12	90	10	1 08	8	1 31	6	1 49
11	7	18	45	....	....	16	62	14	74	12	92	10	1 11	8	1 36	6	1 54
12	7	18	50	....	.....	16	64	14	76	12	95	10	1 14	8	1 38	6	1 58
14	7	18	58	....	.....	16	74	14	86	12	1 16	10	1 38	8	1 64	6	1 85
16	7	18	65	....	.....	16	77	14	90	12	1 21	10	1 43	8	1 71	6	1 93
18	7	18	75	....	.....	16	93	14	1 06	12	1 26	10	1 52	8	1 81	6	2 06
20	7	18	79	....	.....	16	96	14	1 09	12	1 31	10	1 58	8	1 89	6	2 15
16	8	18	80	...	.....	16	98	14	1 12	12	1 35	10	1 62	8	1 93	6	2 21
18	8	18	85	....	.....	16	1 02	14	1 17	12	1 40	10	1 70	8	2 06	6	2 34
20	8	18	90	...	.....	16	1 08	14	1 24	12	1 49	10	1 80	8	2 16	6	2 50
22	8	18	93	...	.....	16	1 11	14	1 27	12	1 54	10	1 86	8	2 27	6	2 59
24	8	18	97	...	.....	16	1 15	14	1 31	12	1 59	10	1 92	8	2 37	6	2 69



For "Double Ends"—sometimes used when buckets are carried by ends instead of back—add to price of bucket chosen as follows, viz.: 12, 17 and 22 cents for 5-inch projection; 14, 19 and 24 cents for 5½-inch projection; 16, 21 and 26 cents for 6-inch projection; 18, 24 and 29 cents for 7-inch projection; 23 cents for 8-inch projection, if made of No. 18 steel; 30 cents for 8-inch projection, if made of No. 16 steel; 37 cents, if made of No. 14 steel.

For "Re-enforced Back"—sometimes used when buckets are carried by back instead of ends—add thirty per cent. to price of bucket. For "Galvanized," add 65 per cent.

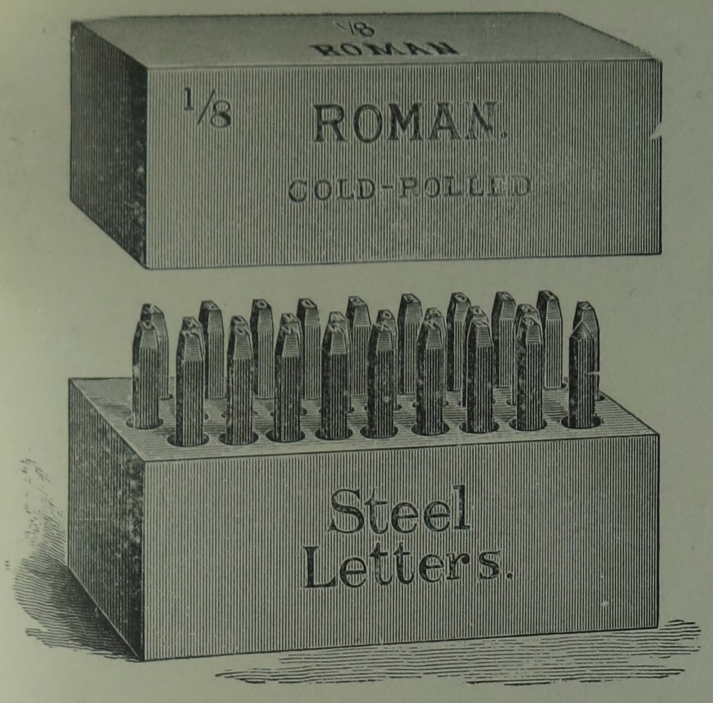
For "Japanned," add to price of any bucket chosen, 7½ per cent. of price of same size in first column of prices. Special sizes and shapes to order in steel, brass, copper or zinc.

MALLEABLE IRON BUCKETS.

LIST.

Length. Inches.	Width. Inches.	Depth. Inches.	Capacity Cubic Inches.	Capacity Quarts.	Price.	Length. Inches	Width. Inches.	Depth. Inches.	Capacity Cubic Inches.	Capacity Quarts.	Price.
4	1½	1	4	....	$0 25	8	5	4½	108	1.6	$ 80
4	3	2½	15	.2	35	10	6	5	160	2.37	1 10
5	4	3	28	.4	45	10	4	3½	60	.9	85
6	4	3½	50	.74	50	12	7	6	300	4.4	1 50
7	4½	4	58	.86	65	12	5½	4½	135	2.	1 10

Suitable for extra heavy work. For coal, ore, stones, etc.



STEEL LETTERS AND FIGURES.

Every set is put up in a neat, compact, dust-proof; wooden box, properly labeled—handy alike to the dealer and the person using them.

For stamping names and figures on steel, iron or other metals. These letters are made of the best steel, are correctly shaped, hardened and the temper carefully drawn. They are used according to size, for stamping key checks, jewelers' checks, baggage checks, iron, steel, wood, leather, patented articles, etc.

LIST.

FIGURES IN SETS.

Size.....Inches,	3/32	1/24	1/20	1/16	1/12	3/32	1/10	1/8
Price.....Per set,	$1 25	1 15	1 13	0 90	0 90	0 90	0 90	0 90
Size.....Inches,	5/32	3/16	1/4	5/16	3/8	7/16	1/2	3/4
Price.....Per set,	$1 13	1 25	1 50	1 75	2 50	3 50	4 50	12 00

ALPHABETS IN SETS.

(Sizes as Above).

Price.....Per set,	$3 75	3 45	3 39	2 70	2 70	2 70	2 70	2 70
Price.....Per set,	$3 39	3 75	4 50	5 25	7 50	10 50	13 50	36 00

SINGLE LETTERS OR FIGURES.

(Sizes as Above).

Price.....Each,	$0 20	0 20	0 20	0 15	0 15	0 15	0 15	0 15
Price.....Each,	$0 16	0 18	0 20	0 25	0 35	0 45	0 50	1 50

SAND AND EMERY PAPER.

FLINT SAND PAPER.

LIST.

Numbers.....	2-0	1-0	½	1	1½	2	2½	3	Assorted.
Price.....Per ream,	$4 50	4 50	4 50	4 50	4 50	5 00	5 00	5 00	4 50

EMERY PAPER.

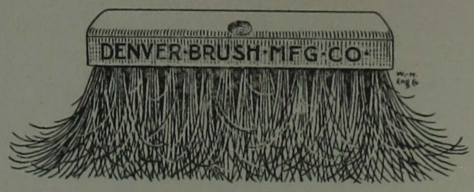
LIST.

Numbers.....	2-0	1-0	½	1	1½	2	2½	3
Price.....Per ream,	$6 50	6 50	6 50	6 50	6 50	7 50	9 50	11 50

EMERY CLOTH.

LIST.

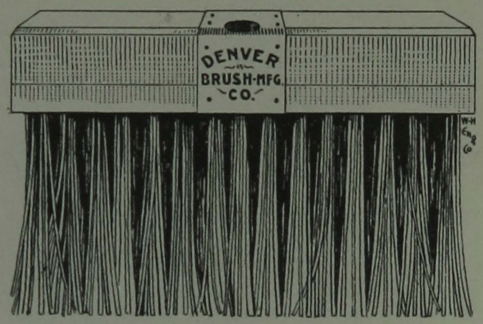
Numbers.....	2-0	1-0	½	1	1½	2	2½	3
Price.....Per ream,	$18 00	18 00	18 00	18 00	18 00	20 00	24 00	26 00



BASS BROOMS.

LIST.

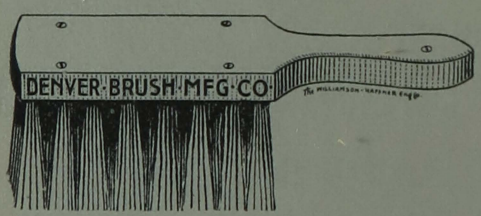
Numbers.		Per Dozen.
1	10½-inch	$10 00
2	12-inch	14 00
3	14-inch	18 00
4	18-inch	22 00
	5-foot Handles	2 00

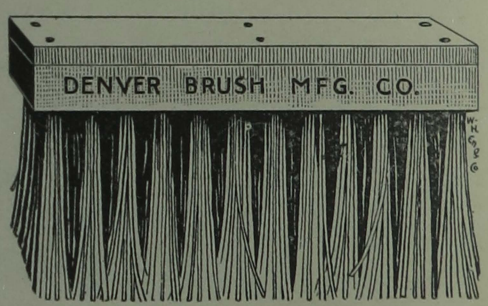


STEEL WIRE BROOMS.

LIST.

	Per Dozen.
12-inch block, 4 row	$10 00
Handles	2 00





MOULDERS' STEEL WIRE BRUSHES.

LIST.

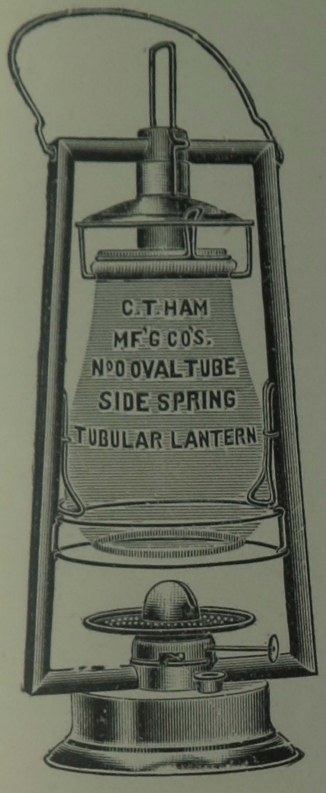
Numbers.		Per Dozen.
1	4 row 4-inch wire	$ 7 00
2	5 row 3½-inch wire	8 00
3		14 00

HEAVY CORN STABLE AND SMELTER BROOMS.

	Per Dozen.
Price	$6 00

TIN TUBULAR LANTERNS.

NO. 0.



BASKET GUARD. LOCKED BURNER.

No. 1 Burner. Five-eighths Inch Wick. No. 0 Globe.

This Lantern is intended for use where a cheap lantern is required.

Packed in cases of 1 dozen each. Furnished in plain tin only.

PACKAGES:

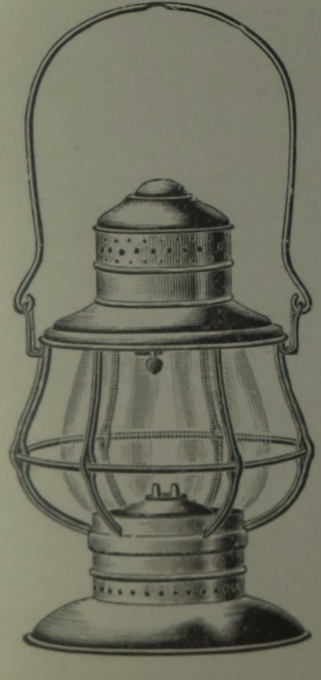
1 Dozen Cases.....Net weight, 20 pounds; gross weight, 32 pounds

½ Dozen Cases.....Net weight, 10 pounds; gross weight, 19 pounds

Price.....Per dozen, $10 50

RAILROAD LANTERNS.

NO. 47.



DOUBLE WIRE. SANGSTER POT. SINGLE GUARD.

For Lard or Sperm Oil, also Kerosene.

ENTIRELY NEW.

The upright guards are constructed of double round wire, in one continuous piece (as shown in cut), more than doubling the strength of the frame and adding but little in weight, thereby producing a very strong and durable lantern.

The bails are so arranged that when the lantern is set down the bail stands upright in position to be instantly grasped, a great convenience over the old style where bail drops to the base of lantern when set down. The bail can be thrown down on the base of the lantern if required.

Price.....Per dozen, $10 00

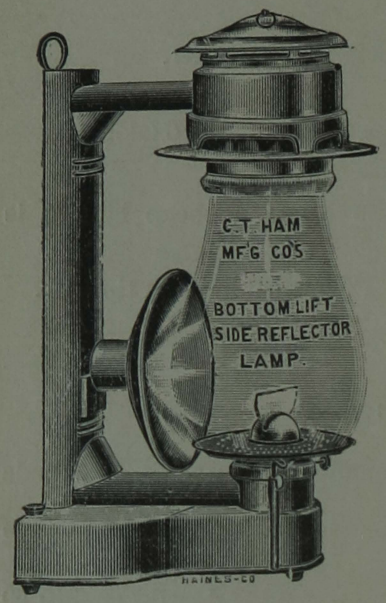
SNC

TIN TUBULAR SIDE REFLECTOR LAMPS.

NO. 12.

SIX-INCH SILVERED GLASS REFLECTOR.

No. 2 Burner. 1-inch Wick. No. 0 Globe.



Finished in blue Japanned and plain.

The cut illustrates our new Tubular Side Reflector Lamp, which can be hung against the wall indoors, or any convenient place out of doors, or carried in the hand. Having our patent wind-break, same as we use on our street lamps, they will stand the wind in exposed places without smoking or blowing out. Produces a very strong light. Can be filled, lighted or trimmed without removing the globe.

Especially adapted for use in stores, warehouses, barns, engine and boiler rooms, or any place where a strong light is required.

Packed in cases of half dozen each. Net weight, 16 pounds; gross weight, 33 pounds.

LIST.

Numbers.		Per Dozen.
72N	Plain tin	$34 50
72P	Japanned	36 00
72R	Brass or copper plated	41 25

GLOBE TUBULAR STREET LAMPS.

NO. 9.

WITH BOTTOM LIFT ATTACHMENT FOR RAISING GLOBE.

OUTSIDE WICK REGULATOR. AUTOMATIC EXTINGUISHER.

No. 3 Globe. 1½-inch Wick. Patent Wind-Break.

Our Globe Street Lamps have many new and modern improvements, solid elbows, automatic time extinguisher, bottom lift attachment, etc.; also our new wind-break around the top of lamp, making it impossible for the wind to extinguish the light.

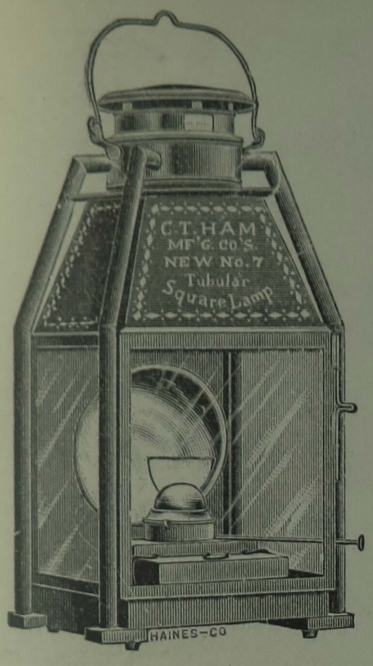
Our patent bottom lift attachment is a great improvement over the old way of raising the globe to light and trim, and for purpose of removing oil fount, as the use of one hand only is required to raise the globe. The possibility of the globe dropping and breaking is positively avoided. The globe is easily removed to clean.

By use of the automatic Extinguisher the lamp can be set, when lighted, to burn a certain number of hours. It will then go out of its own accord, thus saving the trouble and expense of extinguishing. Gives a steady, bright light, free from all flickering.

Packed in cases of one each. Net weight, 7 pounds; gross weight, 29 pounds. Weight of posts, 25 pounds net.

LIST.

Numbers.		
102A	With tin fount	Each, $ 9 00
102K	With glass fount	Each, 9 25
102B	With brass fount	Each, 12 00
102C	With copper fount	Each, 12 00
102D	All brass	Each, 16 00



SQUARE TUBULAR LAMPS.

Gives a very bright light, equal to the best gas jet, and will not smoke or blow out in the strongest wind. Especially adapted for use in warehouses, packing houses, saw mills, lumber yards, freight yards, railway stations, or places where a good strong light is required.

LIST.

Numbers.		Price.
7	Height 22½ inches; weight in case 23 pounds.....	$12 00
8	Height 24½ inches; weight in case 31 pounds.....	12 75

Packed in cases of one each.

TUBULAR "SEARCH LIGHT."

Reflector, 12 inches diameter; 7 inches deep. No. 2 Burner. 1-inch Wick. No. 0 Tubular Globe. Finished in Blue Japan.

Just the lamp you want where a strong light is required, and to be spread over a large space, as in livery stables, barns, saw and planing mills, warehouses, packing houses, work-shops, picnic grounds, lawns, summer resorts, etc. The lamp throws a brilliant and steady light, and will burn as well out of doors as inside, without smoking or flickering, and is not affected by the wind or strong drafts.

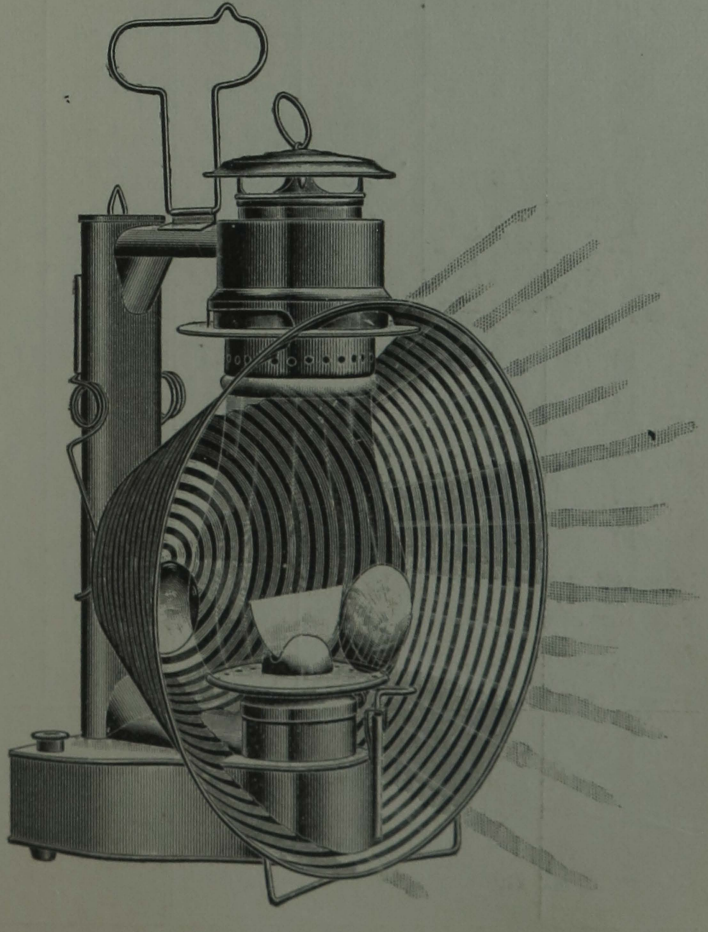
Packed in cases of ½ dozen each.

Furnished as follows:

Numbers.		Per dozen.
20	Japanned and bull's eye globe	$48 00
20	Japanned and plain globe....	47 25

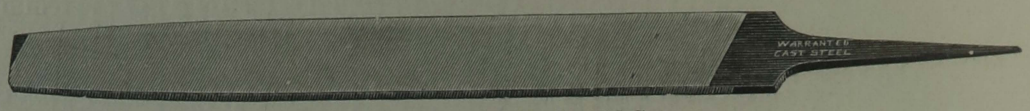
PACKAGES.

Net weight 22 pounds; gross weight 50 pounds.



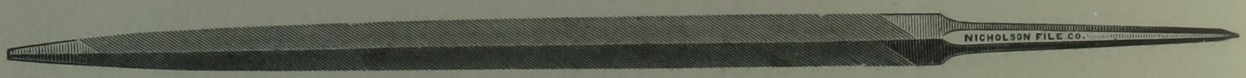
NICHOLSON INCREMENT CUT HAND FILES.

8-Inch Hand Coarse.

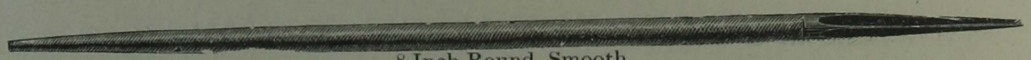


8-Inch Flat Single Cut, 2d Cut.

8-Inch Half Round Open Cut, 2d Cut.



8-Inch Three Square Double Cut, Bastard.



8-Inch Round, Smooth.

LIST OF JANUARY 1, 1896.

Length. Inches.	MILL AND ROUND.			FLAT AND SQUARE.			HAND, WARDING AND PILLAR.		
	Bastard.	Second Cut	Smooth.	Bastard.	Second Cut	Smooth.	Bastard.	Second Cut	Smooth.
4	$ 1 80	$ 2 15	$ 2 40	$ 2 00	$ 2 40	$ 2 65	$ 2 25	$ 2 70	$ 3 00
5	2 00	2 40	2 65	2 20	2 60	2 90	2 50	3 00	3 30
6	2 25	2 65	2 95	2 50	2 95	3 25	2 80	3 30	3 65
7	2 55	3 00	3 30	2 90	3 40	3 75	3 20	3 75	4 15
8	2 90	3 40	3 70	3 40	4 00	4 35	3 70	4 35	4 75
9	3 30	3 85	4 20	4 00	4 70	5 10	4 35	5 10	5 55
10	3 80	4 40	4 80	4 70	5 45	5 90	5 20	6 00	6 55
11	4 50	5 20	5 65	5 60	6 50	7 05	6 30	7 30	7 95
12	5 40	6 20	6 75	6 70	7 70	8 40	7 50	8 60	9 40
13	6 50	7 45	8 05	8 00	9 15	10 00	8 90	10 20	11 00
14	7 80	8 90	9 65	9 50	10 90	11 80	10 50	12 00	13 00
15	9 30	10 60	11 45	11 20	12 75	13 75	12 30	14 00	15 10
16	11 00	12 50	13 40	13 10	14 85	16 00	14 30	16 20	17 50
17	12 90	14 60	15 60	15 25	17 25	18 45	16 60	18 75	20 10
18	15 10	16 90	18 10	17 65	19 75	21 20	19 20	21 50	23 00
19	17 60	19 70	21 10	20 30	22 75	24 35	22 10	24 75	26 50
20	20 40	22 85	24 50	23 20	26 00	27 85	25 30	28 35	30 35

EXTRAS.	EXTRAS.	EXTRAS.
Mill Blunt (Dbl. Cut), adv. 2 in. Mill Dbl. Cut and Machine, adv. 1 in. Mill Narrow Point, adv. 1 in. Mill Triangular and Square, adv. 1 in. Farmers' Own, adv. on Bastard, 1 in.	Cant Blunt (Dbl. Cut), adv. 2 in.	Ginsaw (Single Cut), take Bastard price. Slotting (Blunt), adv. 2 in. Cotter (Blunt or Taper), adv. 2 in. Reaper, adv. on 2d Cut 1 in.

NICHOLSON FILES—Continued.

LIST.

Length. Inches.	MILL, ONE ROUND EDGE.			MILL, TWO ROUND EDGES.			Length. Inches.	Cant and Pit Saw.	Cross Cut.
	Bastard.	Second Cut	Smooth.	Bastard.	Second Cut	Smooth.			
4	$ 1 94	$ 2 31	$ 2 58	$ 2 07	$ 2 47	$ 2 76	3	$ 2 10	.....
5	2 15	2 58	2 85	2 30	2 76	3 05	3½	2 10	.....
6	2 42	2 85	3 17	2 59	3 05	3 39	4	2 20	.....
7	2 74	3 23	3 55	2 94	3 45	3 80	4½	2 30	.....
8	3 12	3 66	3 98	3 34	3 91	4 26	5	2 50	.....
9	3 55	4 14	4 52	3 80	4 43	4 83	5½	2 80	.....
10	4 08	4 73	5 16	4 37	5 06	5 52	6	3 20	$ 2 90
11	4 84	5 59	6 07	5 18	5 98	6 50	7	3 70	3 30
12	5 80	6 67	7 26	6 21	7 13	7 76	8	4 30	3 80
13	6 99	8 01	8 65	7 48	8 57	9 26	9	5 00	4 50
14	8 39	9 57	10 37	8 97	10 24	11 10	10	5 80	5 40
15	10 00	11 40	12 31	10 70	12 19	13 17	11	6 70	6 50
16	11 83	13 44	14 41	12 65	14 38	15 41	12	7 70	7 80
18	16 23	18 17	19 46	17 37	19 44	20 81	*		

* Chisel Pointing same as Hooktooth.

LIST.

Length. Inches.	HALF ROUND AND THREE SQUARE.			Length. Inches.	TAPERS.		SLIM TAPERS.		BANDSAW, BLUNT AND TAPER.	
	Bastard.	Second Cut	Smooth.		Single Cut.	Double Cut	Single Cut.	Double Cut	Regular.	Slim.
4	$ 2 50	$ 3 00	$ 3 30	3	$ 1 10	$ 1 60	$ 1 20	$ 1 80	$ 1 60	$ 1 80
5	2 80	3 35	3 70	3½	1 10	1 60	1 20	1 80	1 60	1 80
6	3 20	3 80	4 15	4	1 20	1 75	1 30	1 90	1 75	1 90
7	3 70	4 35	4 80	4½	1 40	2 00	1 45	2 10	2 00	2 10
8	4 30	5 00	5 50	5	1 70	2 40	1 70	2 40	2 40	2 40
9	5 00	5 85	6 40	5½	2 00	2 75	1 90	2 60	2 75	2 60
10	5 80	6 75	7 30	6	2 40	3 25	2 10	2 85	3 25	2 85
11	6 70	7 75	8 45	7	3 00	4 00	2 50	3 30	4 00	3 30
12	7 80	9 00	9 75	8	3 80	4 95	3 00	3 90	4 95	3 90
13	9 10	10 40	11 25	9	4 60	5 90	3 70	4 70	5 90	4 70
14	10 60	12 10	13 10	10	5 70	7 10	4 50	5 60	7 10	5 60
15	12 40	14 15	15 25	11	7 20	8 80	5 50	6 75	Stavesaw, 8-in. $5 50	
16	14 50	16 50	17 70	12	9 00	10 80	6 80	8 20	Stavesaw, Improved, 8-in.. 7 00	
17	16 90	19 10	20 50	13	11 00	12 90	8 30	9 75		
18	19 60	22 00	23 50	14	13 20	15 20	10 00	11 50		

EXTRAS.

Knife.....adv. 1 in.
Crossing and Tumbler.....adv. 2 in.
Feather Edge (blunt).....adv. 2 in.
High Back Half Round (blunt).adv. 2 in.

PATENT DOUBLE ENDERS.

	No. 7.	No. 8.	No. 9.	No. 10.
Files and Handle.....	$2 55	2 80	3 15	3 70
Files only.....	2 40	2 60	2 90	3 40

The name Double Ender is our Trade Mark.

LIST.

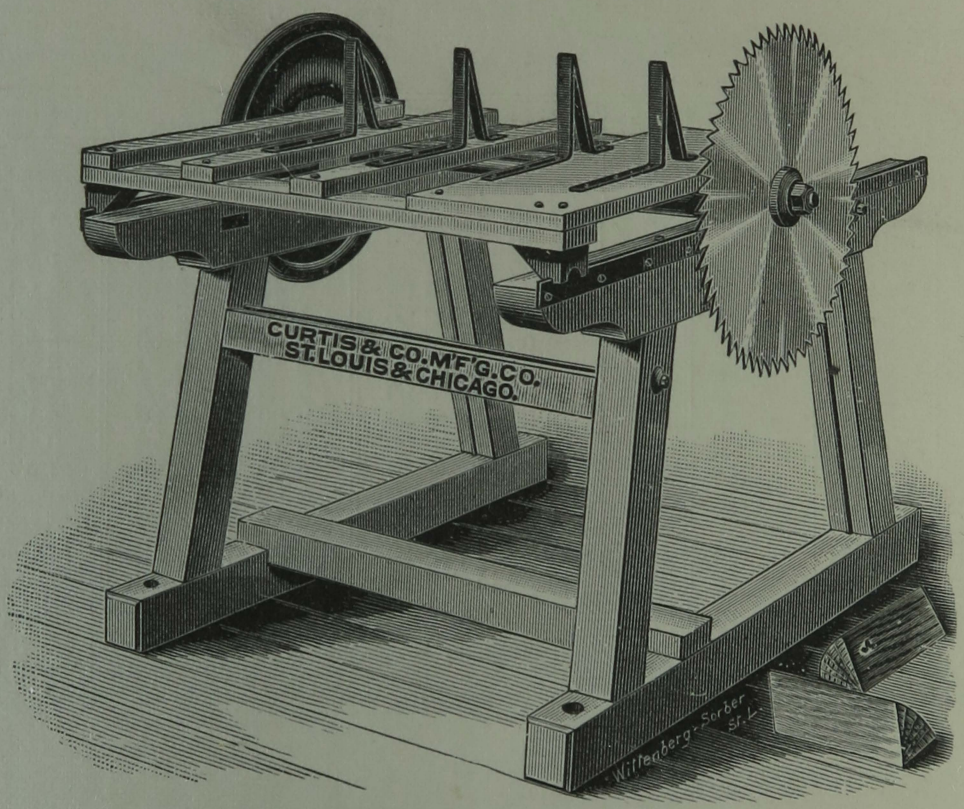
Length. Inches.	HORSE RASPS.		WOOD FILES AND RASPS.				
	Plain.	Tanged.	Flat Wood File.	Half Round Wood File.	Flat and Hlf Rd Wood Rasp.	Cabinet File.	Cabinet Rasp.
6	Our Patent "Racer" Brand Horse Rasps take these prices.		$ 2 50	$ 3 20	$ 4 20	$ 4 20	$ 6 00
7			2 90	3 70	5 00	5 00	7 00
8			3 40	4 30	6 10	6 10	8 20
9			4 00	5 00	7 30	7 30	9 60
10	$ 6 50	$ 9 00	4 70	5 80	8 75	8 75	11 20
11	7 50	10 25	5 60	6 70	10 40	10 40	13 00
12	9 00	12 00	6 70	7 80	12 30	12 30	15 00
13	10 70	14 00	8 00	9 10	14 50	14 50	17 20
14	12 70	16 50	9 50	10 60	16 90	16 90	19 60
15	15 00	19 50	11 20	12 40	19 60	19 60	22 20
16	17 60	23 00	13 10	14 50	22 50	22 50	25 00
17	20 50	.....	.....	.....	.....	.....	.....
18	23 70	.....	.....	.....	.....	.....	.....

BURRO COTTON BELTING.

LIST.

4 PLY.		6 PLY.		8 PLY.	
Width. Inches.	Price per Foot.	Width. Inches.	Price per Foot.	Width. Inches.	Price per Foot.
3	$ 27	6	$ 72	10	$1 50
4	36	7	84	12	1 80
5	45	8	96	14	2 10
6	54	9	1 08	16	2 40
7	63	10	1 20	18	2 70
8	72	12	1 44	20	3 00
9	81	13	1 56	22	3 30
10	90	14	1 68	24	3 60
12	1 08	16	1 92	26	3 90
....	....	....	....	28	4 20
....	....	....	....	30	4 50

For 5-ply, take one-half of difference between 4 and 6.



CORD WOOD SAW MILLS.

The frames are made of seasoned yellow pine, mortised together, securely bolted and well braced, and are very substantial.

The mandrel is of steel, 1½ inches in diameter and 50 inches long, with heavy saw collar, and runs in self-oiling babbitted boxes, which are made swivel, insuring the boxes being always in line.

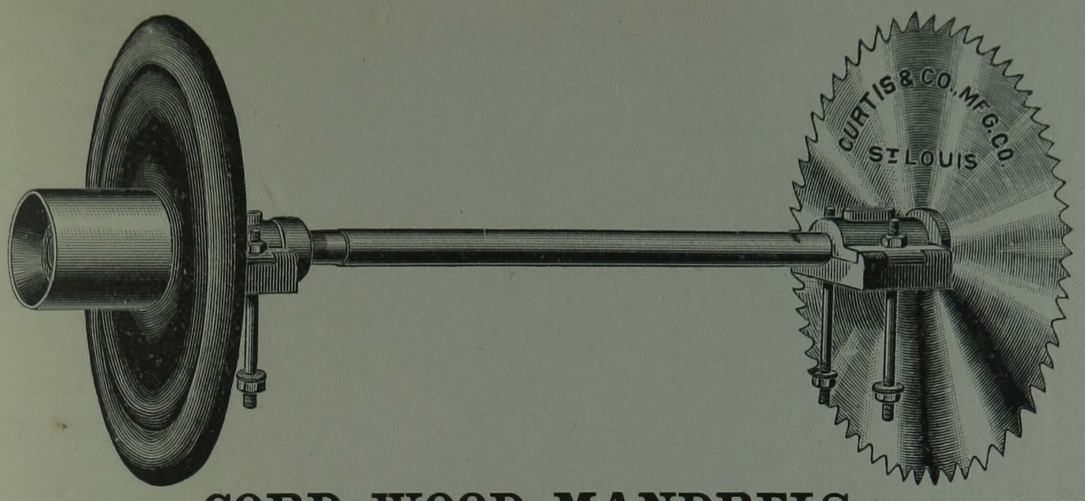
The driving pulley is 6 inches in diameter and 7-inch face, and is turned and keyed on mandrel. The fly wheel is solid web and is well balanced, weighing about 75 pounds.

The slide table runs on four turned rollers and stands, making it easy to operate.

The swing table has a counter balance weight, so that no exertion is required to move table on backward stroke.

LIST.

Mill, complete, with slide or swing table and one 22-inch cross-cut saw.....$30 00
Mill, complete, with slide or swing table and one 24-inch cross-cut saw..... 32 00



CORD WOOD MANDRELS.

LIST.

Price, complete, with self-oiling boxes (without saw) $20 00

POLE ATTACHMENT.

In cases where it is necessary to cut lengths of more than four feet, we build what is known as a Pole Saw, which consists of our slide or swing table machine, with the balance wheel placed lower down on the frame, and with idler pulley so arranged that long timber will pass over the belt and pulleys, thus allowing the saw to cut as long a length as desired.

Price of Mill, complete, with Pole Saw Attachment $45 00

CIRCULAR SAW MANDRELS.

CAST STEEL, SELF OILING.

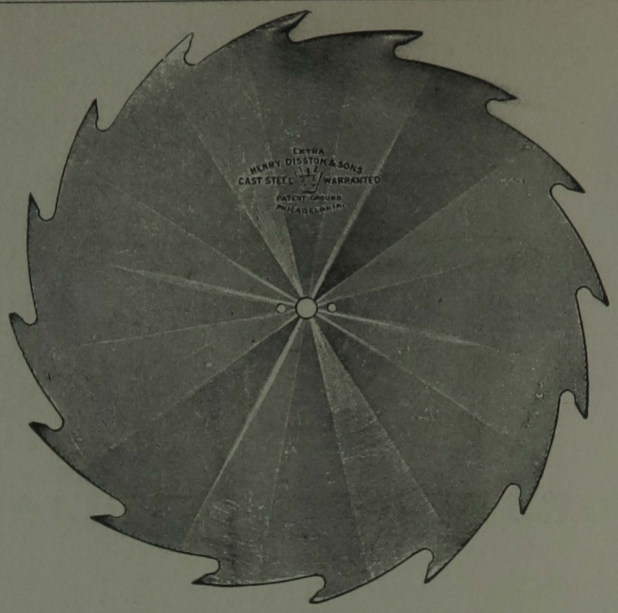
LIST.

PULLEY IN CENTER.

Numbers.	Diameter of Pulley. Inches.	Face of Pulley. Inches.	Diameter of Flange. Inches.	Length of Shaft. Inches.	Diameter of Shaft. Inches.	Size of Hole in Saw. Inches.	Price Each.
1	2½	3½	2½	14	1 1/16	1	$ 7 00
2	3	4	3	16	1 3/16	1⅛	8 00
3	3½	4½	3½	18	1 5/16	1¼	8 50
4	4	5	4	20	1 7/16	1 5/16	9 75
5	4½	5½	4½	22	1 7/16	1 5/16	11 00
6	5	6	5	24	1 7/16	1⅜	12 50
7	5½	6½	5½	26	1 7/16	1⅜	13 75
8	6	7	6	28	1 9/16	1½	15 50
9	7	8	6	32	1 11/16	1⅝	21 50
10	8	8	6	36	1 13/16	1⅝	25 75

PULLEY ON END.

Numbers.	Diameter of Pulley. Inches.	Face of Pulley. Inches.	Diameter of Flange. Inches.	Length of Shaft. Inches.	Diameter of Shaft. Inches.	Size of Hole in Saw. Inches.	Price Each.
1	2½	3½	2½	16½	1 1/16	1	$ 7 70
2	3	4	3	19	1 3/16	1⅛	8 50
3	3½	4½	3½	21½	1 5/16	1¼	9 00
4	4	5	4	24	1 7/16	1 5/16	10 75
5	4½	5½	4½	26	1 7/16	1 5/16	12 00
6	5	6	5	28	1 7/16	1⅜	13 75
7	5½	6½	5½	30½	1 7/16	1⅜	15 00
8	6	7	6	32½	1 9/16	1½	19 50
9	7	8	6	37	1 11/16	1⅝	23 50
10	8	8	6	41	1 13/16	1⅝	28 00



CIRCULAR SAWS.

Patent Ground and Tempered Solid Teeth.

LIST.

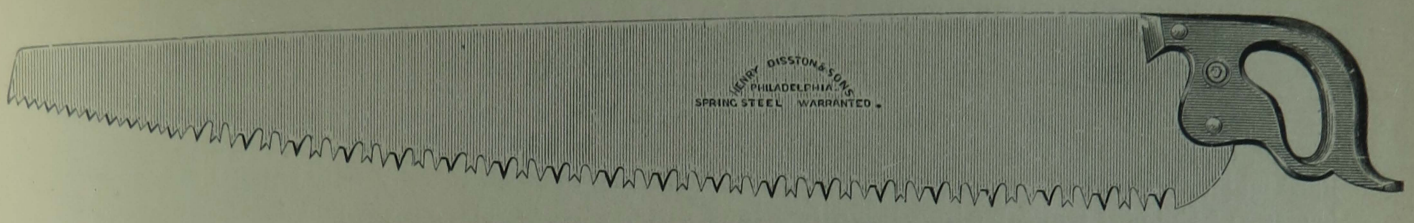
Diam. Inches.	Thickness, Gauge.	Size of Hole. Inches.	Price, Each.	Extra for Each Additional Gauge. (Heavier).	Prices for Beveling New Saws. (Grinding or Beveling Old Saws, Extra). Per Gauge	Diam. Inches.	Thickness. Inches.	Size of Hole. Inches.	Price, Each.	Extra for Each Additional Gauge. (Heavier).	Prices for Beveling New Saws. (Grinding or Beveling Old Saws, Extra). Per Gauge.
1	24	3/8	$ 50	$0 01	$ 06	32	10	1 5/8	$ 20 00	$ 1 00	$1 40
1 1/2	24	3/8	55	01	07	34	9	1 5/8	22 50	1 20	1 55
2	23	3/8	60	01 1/2	08	36	9	1 5/8	25 50	1 40	1 70
2 1/2	22	3/8	65	02	09	38	9	1 5/8	30 00	1 75	1 85
3	21	1/2	70	02 1/2	10	40	9	2	35 00	2 00	2 00
3 1/2	20	1/2	80	03	12	42	8	2	42 00	2 50	2 20
4	19	3/4	1 00	03	14	44	8	2	50 00	3 00	2 40
5	19	3/4	1 20	04	16	46	8	2	60 00	3 50	2 60
6	18	3/4	1 40	05	18	48	8	2	70 00	4 00	2 80
7	18	3/4	1 70	06	20	50	7	2	80 00	4 50	3 00
8	18	7/8	2 00	08	22	52	7	2	90 00	5 00	3 25
9	17	7/8	2 50	10	25	54	7	2	100 00	6 00	3 50
10	16	1	3 00	12	28	56	7	2	115 00	7 00	3 75
11	16	1	3 50	14	30	58	7	2	130 00	8 00	4 05
12	15	1	3 75	17	35	60	6	2	145 00	9 00	4 35
14	15	1 1/8	4 50	21	40	62	6	2	160 00	10 00	4 65
16	14	1 1/8	5 50	25	50	64	6	2	180 00	12 00	5 00
18	13	1 1/4	7 00	30	60	66	6	2	200 00	15 00	5 35
20	13	1 5/16	8 50	35	70	68	5	2	225 00	18 00	5 75
22	12	1 5/16	10 00	45	80	70	5	2	255 00	21 00	6 15
24	11	1 3/8	12 00	55	90	72	5	2	290 00	24 00	6 55
26	11	1 3/8	14 00	65	1 05	74	5	2	330 00	27 00	7 00
28	10	1 1/8	16 00	80	1 20	76	5	2	375 00	30 00	7 50
30	10	1 1/2	18 00	90	1 30	..	..	...	.....	.....	.....

Circular Saws to cut metal or ivory, 50 per cent. advance. No extra charge for Saws one gauge thicker than list. Circular Saws beveled one gauge without extra charge, up to 44 inches. Forty-four inches and larger, beveled two gauges without extra charge.

SAW GUIDES.

LIST.

NO. 1, FOR ORDINARY MILLS.		NO. 2, FOR HEAVY WORK.	
Guide, without rounder	$6 00	Guide, without rounder	$10 00
Guide, with rounder	9 00	Guide, with rounder	13 00



ONE MAN CROSS-CUT SAWS.

WITH REVERSIBLE HANDLE, "EXTRA" QUALITY STEEL, PATENT GROUND.

LIST.

Length	Feet,	3	3½	4	4½	5	5½
Price	Each,	$2 75	2 75	3 50	4 00	4 50	5 00

This saw can be adjusted for either one or two men.

GREAT AMERICAN CROSS-CUT SAWS.

FOR TWO MEN.

Price ..... Per foot, $0 60

Handles extra.

DISSTON'S CONQUEROR SWAGES.

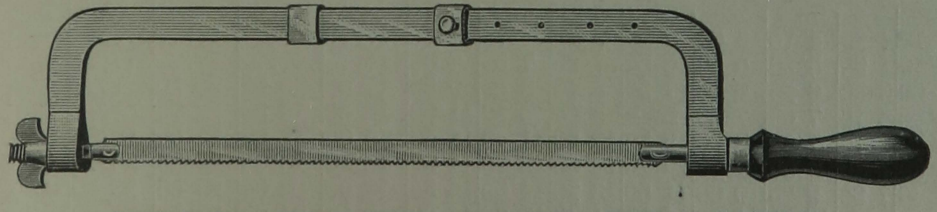
LIST.

Numbers.		
00		$4 00
0		3 50
1		3 00
2		2 50
3		2 00

MIXTER'S SAW TOOTH SWAGE AND SHARPENERS.

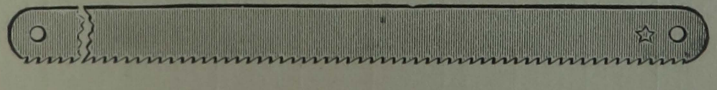
LIST.

Numbers.		
3	Double swage, largest size, for saws of from 5 to 10 gauge	$7 00
2	Double swage, medium size, for saws of from 8 to 12 gauge	6 00
1	Double swage, for all thinner gauges	5 00
0	Double swage, for small thin saws	4 00
00	Double swage, for very small thin saws	3 00



STAR HACK SAW FRAMES.

Price ..... Per dozen, $18 00



STAR HACK SAW BLADES.

LIST.

Length of blade	Inches,	6	7	8	9	10	11	12
Price	Per dozen,	$0 55	0 60	0 65	0 70	0 85	0 95	1 05

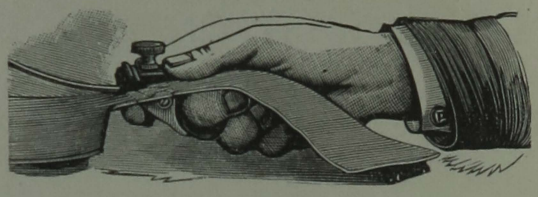
LUMBERMEN'S STANDARD CANT HOOKS.

WITH MALLEABLE OPEN SOCKET.

This tool is made with clasp, toe ring and wear iron in one piece. It has great strength and durability, and can be very easily repaired in case of breakage of handle. We can furnish handle of hard maple, hickory or second growth white ash, but carry in stock usually only maple. The socket is made of the best malleable iron. The bolt is of steel, with hexagon head and nut, square under head to prevent turning. The hooks are made of one and seven-sixteenths inch hammered crucible cast steel, hand forged. Duck bill pattern only carried in stock. Other patterns same price. Prices below are with hard maple handles. Add $1.50 per dozen for hickory handles.

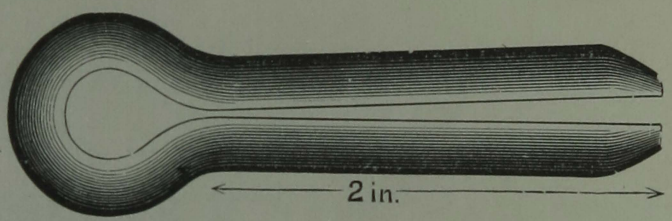
LIST.

Numbers.		Per dozen.
257	2⅝ inches x 4½, 5 or 5½ foot handles, weight per dozen 100 pounds	$24 00
258	2¾ inches x 4½, 5 or 5½ foot handles, weight per dozen 120 pounds	26 00



LACE CUTTERS.

Price.....Each, $1 25

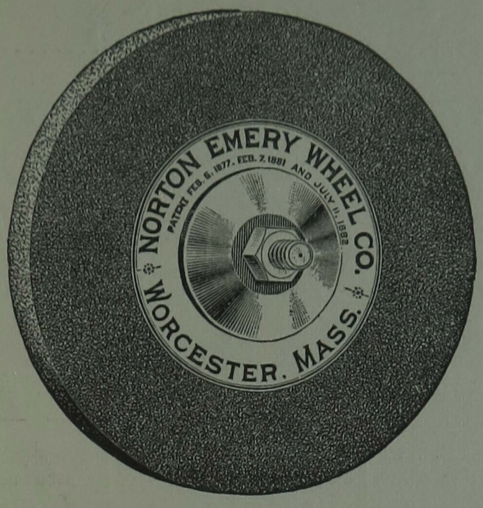


SPRING COTTERS.

LIST.

Per Thousand.

Length From Point To Neck. Inches.	DIAMETER, INCHES.														
	3/32	7/64	1/8	9/64	5/32	11/64	3/16	13/64	7/32	1/4	5/16	3/8	7/16	1/2	5/8
½	$3 75	4 25	4 75	5 00	5 50	6 00	.....	.....	.....	.....	.....	.....	.....	.....	.....
¾	4 40	4 90	5 50	5 80	6 50	7 20	7 50	8 00	.....	.....	.....	.....	.....	.....	.....
1	5 00	5 50	6 25	6 60	7 50	8 40	8 80	9 50	12 00	15 00	20 50	.....	.....	.....	.....
1¼	5 60	6 10	7 00	7 40	8 50	9 60	10 10	11 00	13 50	16 50	22 75	.....	.....	.....	.....
1½	6 20	6 70	7 75	8 20	9 50	10 80	11 40	12 50	15 00	18 00	25 00	28 50	.....	.....	.....
1¾	6 80	7 30	8 50	9 00	10 50	12 00	12 70	14 00	16 50	20 00	27 25	30 75	39 00	.....	.....
2	7 40	7 90	9 25	10 00	11 50	13 20	14 00	15 50	18 00	22 00	29 50	33 50	43 50	52 50	.....
2¼	.....	....	10 00	11 00	12 50	14 40	15 30	17 00	19 50	24 00	31 75	36 00	47 25	57 75	.....
2½	.....	....	10 75	12 00	13 50	15 60	16 80	18 50	21 00	26 25	34 00	38 75	51 00	63 00	.....
2¾	.....	....	.....	.....	.....	.....	18 30	20 50	23 50	28 00	36 75	40 50	54 75	68 00	.....
3	.....	....	.....	.....	.....	.....	19 80	22 00	25 00	30 00	39 75	43 25	58 50	73 50	112 50
3¼	.....	....	.....	.....	.....	.....	.....	.....	.....	32 00	42 75	46 00	62 25	78 75	118 50
3½	.....	....	.....	.....	.....	.....	....	.....	.....	34 00	45 00	48 75	66 00	84 00	124 50
3¾	.....	....	....	.....	.....	.....	.....	.....	.....	36 50	47 25	51 75	69 75	89 25	130 50
4	.....	....	....	.....	.....	.....	.....	.....	.....	39 00	49 50	54 75	73 50	94 50	136 50
5	.....	....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	88 50	115 50	160 50
6	.....	....	.....	.....	.....	.....	....	.....	....	.....	.....	.....	.....	136 00	184 50
Wire Gauge	13	12	11	10	9	8	7	6	5	4	1	.....	.....	.....	.....



NORTON EMERY WHEELS.

REGULAR WHEELS.

LIST.

Diameter. Inches.	THICKNESS OF WHEELS, INCHES.																	Rev'lutions Per Minute	
	¼	⅜	½	⅝	¾	⅞	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	4	Minimum.	Maximum.
1	$ 25	$ 30	$ 30	$ 35	$ 35	$ 40	$ 40	$ 45	$ 50	$ 55	$ 60	$ 65	$ 70	$ 75	$ 80	$ 85	90	$ 1 00	13000	18000
1½	30	35	40	45	45	50	50	55	60	65	70	75	80	85	90	95	1 00	1 10	10500	14000
2	35	45	50	55	55	60	60	65	70	75	80	85	90	95	1 00	1 05	1 10	1 20	7900	11000
2½	40	55	65	70	75	80	85	95	1 05	1 15	1 25	1 35	1 45	1 55	1 65	1 75	1 85	2 05	6330	8800
3	50	65	80	90	95	1 05	1 10	1 25	1 40	1 55	1 70	1 85	2 00	2 15	2 30	2 45	2 60	2 90	5275	7400
3½	60	80	95	1 05	1 15	1 25	1 35	1 55	1 75	1 95	2 15	2 35	2 55	2 75	2 95	3 15	3 35	3 75	4500	6300
4	75	95	1 10	1 25	1 35	1 50	1 60	1 85	2 10	2 35	2 60	2 85	3 10	3 35	3 60	3 85	4 10	4 60	3950	5500
4½	90	1 10	1 25	1 40	1 55	1 70	1 85	2 15	2 45	2 75	3 05	3 35	3 65	3 95	4 25	4 55	4 85	5 45	3500	4900
5	1 00	1 20	1 40	1 60	1 80	2 00	2 20	2 60	3 00	3 40	3 80	4 20	4 60	5 00	5 40	5 80	6 20	7 00	3160	4400
6	1 40	1 60	1 75	2 10	2 40	2 75	3 05	3 70	4 35	5 00	5 65	6 30	6 95	7 60	8 25	8 90	9 55	10 85	2640	3700
7	1 85	2 00	2 15	2 60	3 00	3 45	3 85	4 70	5 55	6 40	7 25	8 10	8 95	9 80	10 65	11 50	12 35	14 05	2260	3160
8	2 10	2 35	2 60	3 10	3 60	4 10	4 60	5 60	6 60	7 60	8 60	9 60	10 60	11 60	12 60	13 60	14 60	16 60	1980	2770
9	2 50	2 80	3 10	3 70	4 25	4 85	5 40	6 55	7 70	8 85	10 00	11 15	12 30	13 45	14 60	15 75	16 90	19 20	1760	2460
10	3 00	3 35	3 65	4 35	5 00	5 70	6 35	7 70	9 05	10 40	11 75	13 10	14 45	15 80	17 15	18 50	19 85	22 55	1580	2210
12	3 60	3 80	4 00	5 00	6 00	6 70	7 40	9 00	10 70	12 75	14 00	15 70	17 40	19 00	20 75	22 50	24 25	27 50	1320	1850
14	4 05	5 15	6 25	7 35	8 45	9 55	10 65	12 85	15 05	17 25	19 45	21 65	23 85	26 05	28 25	30 45	32 65	37 05	1130	1580
16	....	....	...	....	10 85	12 30	13 70	16 55	19 40	22 25	25 00	27 95	30 80	33 65	36 50	39 35	42 20	47 90	990	1380
18	....	....	....	....	13 25	15 15	17 00	20 75	24 50	28 25	32 00	35 75	39 50	43 25	47 00	50 75	54 50	62 00	880	1230
20	....	....	....	....	.....	.....	20 25	24 75	29 25	33 75	38 25	42 75	47 25	51 75	56 25	60 75	65 25	74 25	790	1100
22	....	....	....	....	.....	.....	25 00	31 00	37 00	43 00	49 00	55 00	61 00	67 00	73 00	79 00	85 00	97 00	720	1000
24	....	....	....	....	.....	.....	29 00	36 00	43 00	50 00	57 00	64 00	71 00	78 00	85 00	92 00	99 00	113 00	660	920
26	....	....	....	....	.....	.....	.....	43 00	51 00	59 00	67 00	75 00	83 00	91 00	99 00	107 00	115 00	131 00	600	850
30	....	..	....	....	..	.....	....	.....	61 00	72 00	83 00	94 00	105 00	116 00	127 00	138 00	149 00	171 00	500	735

EMERY CYLINDERS AND CUP WHEELS.

LIST.

Diameter. Inches.	THICKNESS OF RIM, INCHES.						
	1	1½	2	2½	3	3½	4
8	$15 50	.....	.....	.....	.....	.....	.....
9	16 50	$ 22 00	.....	.....	.....	.....	.....
10	17 75	24 25	$ 29 50	.....	.....	.....	.....
12	18 75	26 25	33 00	$ 38 75	$ 44 00	...	.....
14	22 50	31 00	38 50	45 50	51 50	$ 57 50	$ 61 50
16	26 00	35 75	44 60	53 00	60 25	67 60	73 00
18	28 80	40 25	51 40	61 40	71 00	79 00	86 90
20	30 90	44 00	56 25	67 40	78 50	87 60	97 00
22	35 00	49 75	65 00	79 40	91 50	103 90	115 50
24	37 50	54 25	70 50	86 25	99 50	113 60	126 60
26	39 75	59 80	77 00	93 00	109 25	124 75	139 25

Above list is figured on a basis of cylinders 7 inches long; other lengths at proportionate rates.

To obtain price of Cup Wheels, add the price of a regular wheel whose diameter is the inside diameter of the cylinder, and thickness whatever is required.

GRINDSTONES.

Price.....Per pound, $0 10

MOUNTED GRINDSTONES.

Mounted on a strong, neat frame. Easily knocked down for shipment, and easily set up.

Numbers.	LIST.	Price.
1	Stone weighs 80 to 100 pounds.....Each,	$6 00
2	Stone weighs 60 to 80 pounds.....Each,	5 00
3	Stone weighs 40 to 60 pounds.....Each,	4 75

SPROCKET CHAIN.

LIST.

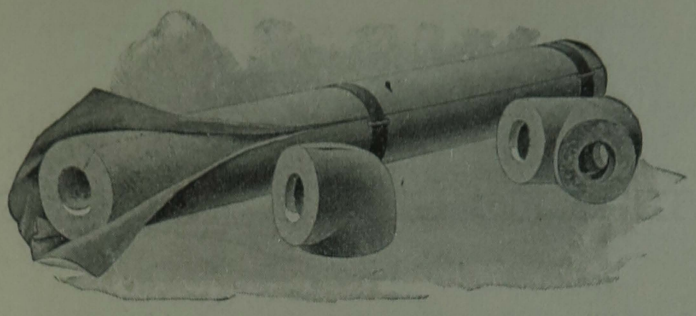
Numbers.	Working Strain.	Approximate in Leather Belting. Inches.	Price Per Foot.	Links Per Foot.	Numbers.	Working Strain.	Approximate in Leather Belting. Inches.	Price Per Foot.	Links Per Foot.
25	75	1 single	$0 08	13.3	67	700	7 single	$0 16	5.2
32	150	1½ single	08	10.5	75	750	7½ single	18	4.6
33	200	2 single	07	8.6	77	800	8 single	18	5.2
34	225	2½ single	08	8.6	78	1000	10 single	21	4.6
35	250	2½ single	08	7.4	83	1200	12 single	25	3.
42	300	3 single	09	8.8	85	1300	9 double	27	3.
45	350	3½ single	09	7.4	88	1200	8 double	25	4 6
51	375	3½ single	11	10.5	95	1600	10 double	32	3.
52	500	4 single	12	8.	103	1800	12 double	40	4.
55	450	4 single	12	7 4	105	1500	10 double	35	2.
57	600	6 single	12	5.2	106	1700	11 double	45	2.
62	650	6½ single	16	7 3	107	1600	10 double	40	2.
66	700	7 single	16	6.	108	2000	13 double	40	2.55

NOTE.—In some instances several numbers of Sproket Chain run on same wheels, as in case of Nos. 57, 67 and 77. See Wheel List.

SPROCKET WHEELS.

LIST.

NUMBERS 35, 45, 55.			NUMBERS 57, 67, 77.			NUMBERS 75, 78, 88.			NUMBERS 85, 95.		
Diam.	Teeth.	Price.	Diam.	Teeth.	Price.	Diam.	Teeth.	Price.	Diam.	Teeth.	Price.
2½	5	$ 90	4¾	6	$1 45	5	6	$1 65	7¾	6	$2 60
3	6	1 00	5½	7	1 55	6	7	1 80	10	8	3 25
3¾	7	1 10	6	8	1 70	6½	8	2 00	12½	10	4 00
4¼	8	1 25	6¾	9	1 85	7½	9	2 20	13½	11	4 30
4¾	9	1 35	7½	10	2 00	8¼	10	2 40	16	13	5 35
5¼	10	1 45	8	11	2 15	9	11	2 60	17½	14	5 70
5¾	11	1 55	8¾	12	2 30	10	12	2 80	20	16	6 90
6	12	1 65	9½	13	2 50	10¾	13	3 00	22½	18	8 10
7	13	1 75	11	15	2 85	11½	14	3 20	24	19	8 70
7¼	14	1 85	12½	17	3 25	12½	15	3 40	30	24	11 75
8½	16	2 05	14	19	3 65	14¼	17	3 90	33	26	13 50
8¾	17	2 15	14¾	20	3 85	16	19	4 40	34	27	14 50
9½	18	2 25	15½	21	4 05	16½	20	4 65	35½	28	15 50
10	19	2 35	16½	22	4 25	18½	22	5 15	60	47	36 00
10½	20	2 45	17	23	4 50	20	24	5 65	....	..	....
11½	22	2 70	18¼	25	5 00	21	25	5 90	....	..	....
12	23	2 80	19¾	27	5 50	22½	27	6 40	....	..	....
12½	24	2 90	20	28	5 75	24	29	6 90	....	..	....
13	25	3 00	22	30	6 25	24¾	30	7 15	....	..	....
14¼	27	3 30	24¼	33	7 00	28½	34	8 55	....	..	....
16	31	3 70	26	36	7 75	29½	35	8 90	....	..	....
18¼	35	4 20	28	38	8 25	30½	37	10 00	....	..	....
20¼	39	4 65	30	41	9 00	32½	39	10 90	....	..	....
21¾	42	5 00	32½	44	9 75	33½	40	11 40	....	..	....
23½	45	5 40	36	49	12 00	37	44	12 80	....	..	....
28	54	7 00	38½	52	13 50	38	46	14 00	....	..	....
30	58	7 50	41½	56	15 50	42	49	16 50	....	..	....
36	69	10 50	44¼	60	17 00	48	58	22 50	....	..	....
42	82	14 00	47½	64	21 00	64	77	33 50	....	..	....



H. W. JOHN'S ASBESTO-SPONGE MOULDED COVERING.

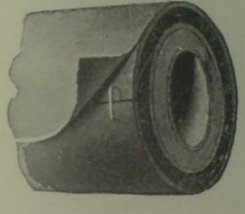
This form of covering is offered as the most durable and effective moulded non-conducting covering yet produced. It combines the advantages of our Asbesto-Sponge Cement Felting in a portable form, is absolutely fire-proof, and is adapted for highest steam pressure. It is supplied in sections of all sizes, three feet long, which are provided with canvas jackets and metal bands to hold them firmly in place, and can be easily applied by unskilled workmen.

LIST.

Inside Diam. of Pipe. Inches.	Covering. Per Foot	Elbows. Each.	Tees. Each.	Valves. Each.	Inside Diam. of Pipe. Inches.	Covering. Per Foot.	Elbows. Each.	Tees. Each.	Valves. Each.
½ and ¾	$0 17	$0 20	$0 28	$0 21	4	$0 37	$0 37	$ 50	$ 50
1	18	20	28	21	4½	39	39	54	54
1¼	19	20	28	21	5	42	42	57	57
1½	20	20	28	21	6	48	48	64	64
2	23	23	30	24	7	54	54	74	74
2½	25	25	34	34	8	62	62	82	82
3	30	30	42	42	9	67	67	92	92
3½	34	34	45	45	10	74	74	1 00	1 00

ASBESTOS AND HAIR FELT REMOVABLE COVERING.

(PATENTED.)



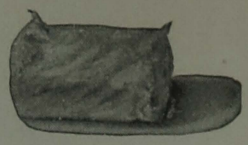
This form of our air-chamber covering is composed of standard hair felt with an inner layer of asbestos fibre of equal thickness, the whole enclosed in a strong wrapper or case of sheathing and a lining of asbestos sheathing.

In sections three feet long, cut to pass over the pipe; strips and staples sent with each shipment.

Special fittings are supplied with this covering.

LIST.

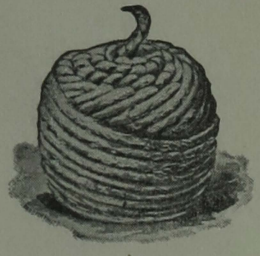
Inside Diam. of Pipe. Inches.	Covering. Per Foot.	Elbows. Each.	Tees. Each.	Valves. Each.	Inside Diam. of Pipe. Inches.	Covering. Per Foot.	Elbows. Each.	Tees. Each.	Valves. Each.
½ and ¾	$0 15	$0 19	$0 27	$0 20	4	$0 34	$0 34	$0 47	$0 47
1	17	19	27	20	4½	37	37	50	50
1¼	18	19	27	20	5	38	38	53	53
1½	19	19	27	20	6	44	44	60	60
2	22	22	29	23	7	50	50	69	69
2½	24	24	33	33	8	55	55	77	77
3	28	28	39	39	9	60	60	85	85
3½	32	32	43	43	10	68	68	94	94



ASBESTOS STEAM PACKING.

LIST.

	Per Pound.
On reels containing 15, 25 and 50 pounds each; regular sizes from ¼ to 2 inches in diameter	$0 50
Also in the above sizes:	
Asbestos Braided Packing	50
Asbestos Lubricated Packing	50
Asbestos and Hemp Lubricated Packing	50



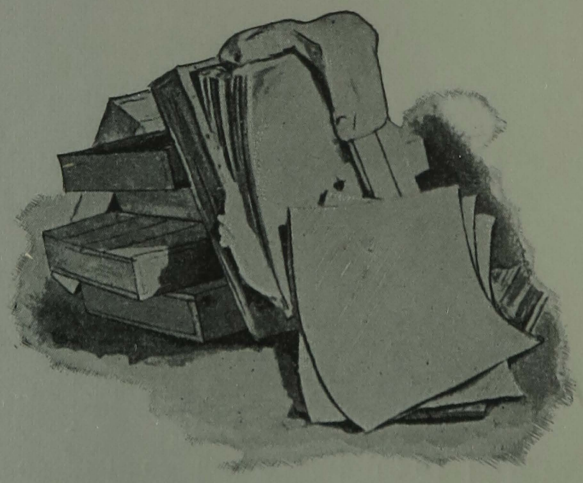
ASBESTOS WICK PACKING.

This article is composed of the purest and finest asbestos fibre, spun into strands (which can be separated) and made into the form of a soft, strong "lamp wick" which can be wound or packed in any desired shape around small steam and other valve-stems, pumps, etc.; and, being strictly acid and fire-proof, is valuable for use in chemical works, etc.

LIST.

	Per Pound.
In ¼, ½ and 1 pound balls and on 5 and 10 pound spools	$0 50
Asbestos Lubricated Wick Packing	50

NOTE.—The cotton with which imitations of our asbestos packings are adulterated can be easily detected by subjecting them to flame.



ASBESTOS MILL-BOARD.

LIST.

	Per Pound.
In sheets, 40 x 40 and 42 x 44 inches, from 1/32 to ½-inch thick; weighing from 1½ to 28 pounds	$0 15
Extra quality, made from long fibre, for electrical work, etc.	25

ASBESTOS GASKETS.

All sizes, not exceeding 42 inches outside diameter, from $\frac{1}{32}$ to $\frac{1}{2}$ of an inch thick, cut to order from our Asbestos Mill-Board—weight less than one-half as much as India Rubber.

LIST.

Regular Shapes, round or square	Per pound,	$1 00
Rings and Washers, 3 inches or less in diameter	Per pound,	1 25

ASBESTOS IMPERMEABLE GASKETS.

LIST.

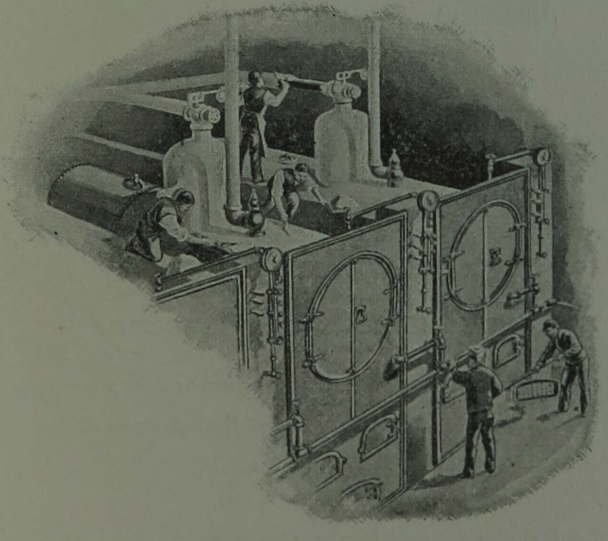
Regular Shapes	Per pound,	$ 75
Asbestos Impermeable Rings and Washers	Per pound,	1 40

Send pattern or drawing with orders for irregular shapes.

ASBESTOS CORDED SHEATHING.

This consists of pure Asbestos Sheathing, to the surface of which are attached loosely-twisted rolls of Asbestos, forming a material about $\frac{1}{4}$ of an inch thick. It is particularly valuable as a strictly fire-proof, non-conducting covering for furnaces, furnace pipes, and other fire-heated surfaces.

In rolls containing 100 and 150 square feet, 36 inches wide ..... Per square foot, $0 40



ASBESTOS CEMENT.

In sacks of 125 pounds each.

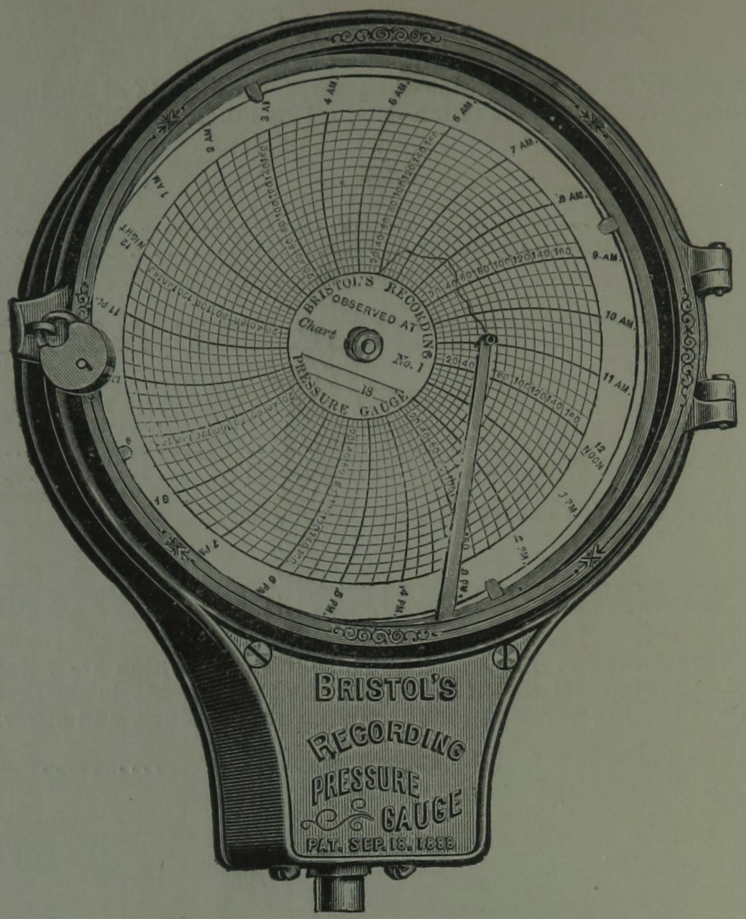
Price ..... Per sack, $6 00

HAIR FELT.

Best quality. In bales of 300 square feet, 6 feet wide.

LIST.

½ inch thick	Per square foot,	$0 08
⅝ inch thick	Per square foot,	10
¾ inch thick	Per square foot,	12



BRISTOL'S RECORDING PRESSURE GAUGES.

MAKES A CONTINUOUS RECORD, DAY AND NIGHT, OF STEAM, WATER, GAS, OIL OR AIR PRESSURE.

ADAPTED TO ALL RANGES OF PRESSURE.

Users of steam in manufactories and mills, water and gas works, electric light and power stations, public buildings and institutions, hotels, etc., will find the instrument of great value, as it shows at a glance whether the boiler has received the attention upon which largely depends its safety and economy.

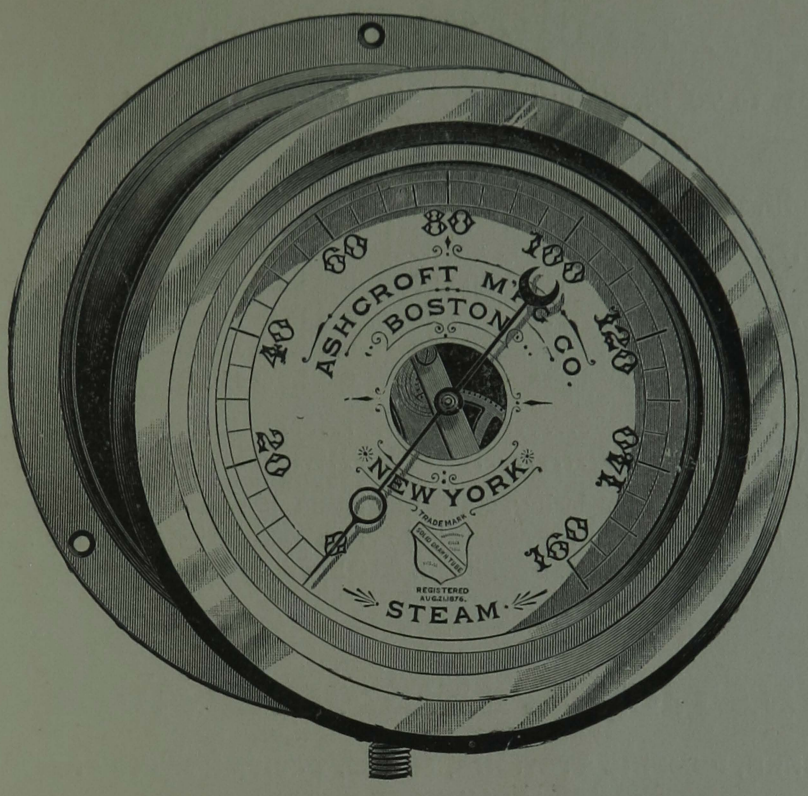
The simple construction of the Bristol Gauge insures uniformly accurate indications and records.

LIST.

BRISTOL'S RECORDING PRESSURE AND VACUUM GAUGES.

Nickel plate, including ink and 100 charts	$50 00
Polished aluminum, including ink and 100 charts	60 00
Electric Alarm Attachment (extra)	10 00
Special Chart to order (extra)	15 00
Additional Charts	Per hundred, 1 00
Additional Charts (copying ink)	Per hundred, 1 25
Special Recording Gauge Ink	Per bottle, 50

In ordering Gauges, state maximum working pressure or vacuum.



STEAM AND VACUUM GAUGES.

SOLID DRAWN SEAMLESS TUBE.

GAUGES OF 300 POUNDS PRESSURE OR LESS.

LIST.

Brass Case.		Iron Case.	
12 inch Dial	$75 00	12 inch Dial	$50 00
10 inch Dial	40 00	10 inch Dial	32 00
8½ inch Dial	30 00	8½ inch Dial	22 00
6¾ inch Dial	20 00	6¾ inch Dial	16 00
6 inch Dial	16 00	6 inch Dial	13 00
5½ inch Dial	12 00	5½ inch Dial	10 00
5 inch Dial	11 00	5 inch Dial	8 00
4½ inch Dial	10 00	4½ inch Dial	8 00
3½ inch Dial	9 00	3½ inch Dial	7 00
3 inch Dial, or smaller	8 00	3 inch Dial, or smaller	6 00

Nickel plating extra. No Gauge warranted unless properly connected with syphon. Gauges should indicate about double the working pressure. All Gauges are graduated by open mercury column, and warranted correct.

AMMONIA GAUGES.

IRON CASE.

LIST.

	Price.
8½ inch Dial	$45 00
6¾ inch Dial	40 00
6 inch Dial	35 00

HYDRAULIC GAUGES.

FROM 10 TO 10,000 POUNDS. STEEL TUBE FOR HIGH PRESSURES.

LIST.

Brass Case.		Iron Case, Brass Ring.	
12 inch Dial	$125 00	12 inch Dial	$110 00
10 inch Dial	100 00	10 inch Dial	90 00
8½ inch Dial	80 00	8½ inch Dial	70 00
6¾ inch Dial	60 00	6¾ inch Dial	50 00
6 inch Dial	40 00	6 inch Dial	35 00

Hydraulic Cock for Gauge $6 00
Hydraulic Check Valve for Gauge 3 50

Nickel plating extra. In ordering, state maximum pressure required; graduations should be one-third greater. If dial is to show pressure in tons on ram, give exact diameter of pison. With independent maximum pressure registering hand, $5.00 extra, net.

COMBINATION WATER-PRESSURE GAUGES.

FOR WATER WORKR, PUMPING STATIONS, MINES, ETC., SHOWING PRESSURE AND FEET IN COLUMN OF WATER.

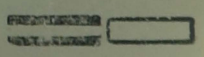
This Gauge has two sets of graduations—one showing pounds pressure to the square inch, the other showing height in feet of water in column. It is used to show pressures developed by pumps, in mines, working against not only head, but resistance of friction and turns in pipes.

LIST.

Brass Case, Inciuding Cock.		Iron Case, Including Cock.	
12 inch Dial	$80 00	12 inch Dial	$60 00
10 inch Dial	50 00	10 inch Dial	40 00
8½ inch Dial	40 00	8½ inch Dial	30 00
6¾ inch Dial	25 00	6¾ inch Dial	20 00
6 inch Dial	20 00	6 inch Dial	16 00
5½ inch Dial	16 00	5½ inch Dial	14 00

Nickel plating extra. State in orders highest working pressure or feet to be recorded.

PRINDLE'S SYPHON COCKS.



FOR STEAM GAUGES.

LIST.

Straight Syphon, with Cock ..... Each, $1 50
Straight Syphon, without Cock ..... Each, 1 00
Elbow Syphon, with Cock ..... Each, 1 50
Elbow Syphon, without Cock ..... Each, 1 25

IRON SYPHONS FOR STEAM GAUGES.

Size of Iron Pipe, ¼ inch.

Price ..... Each, $0 50

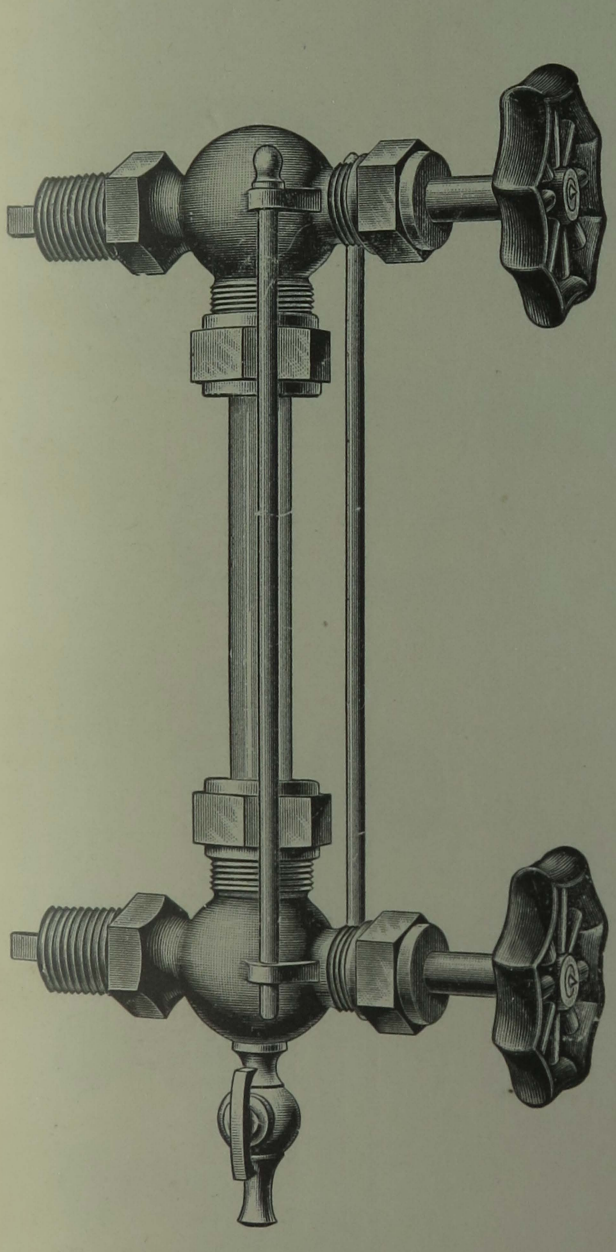
WATER GAUGES.

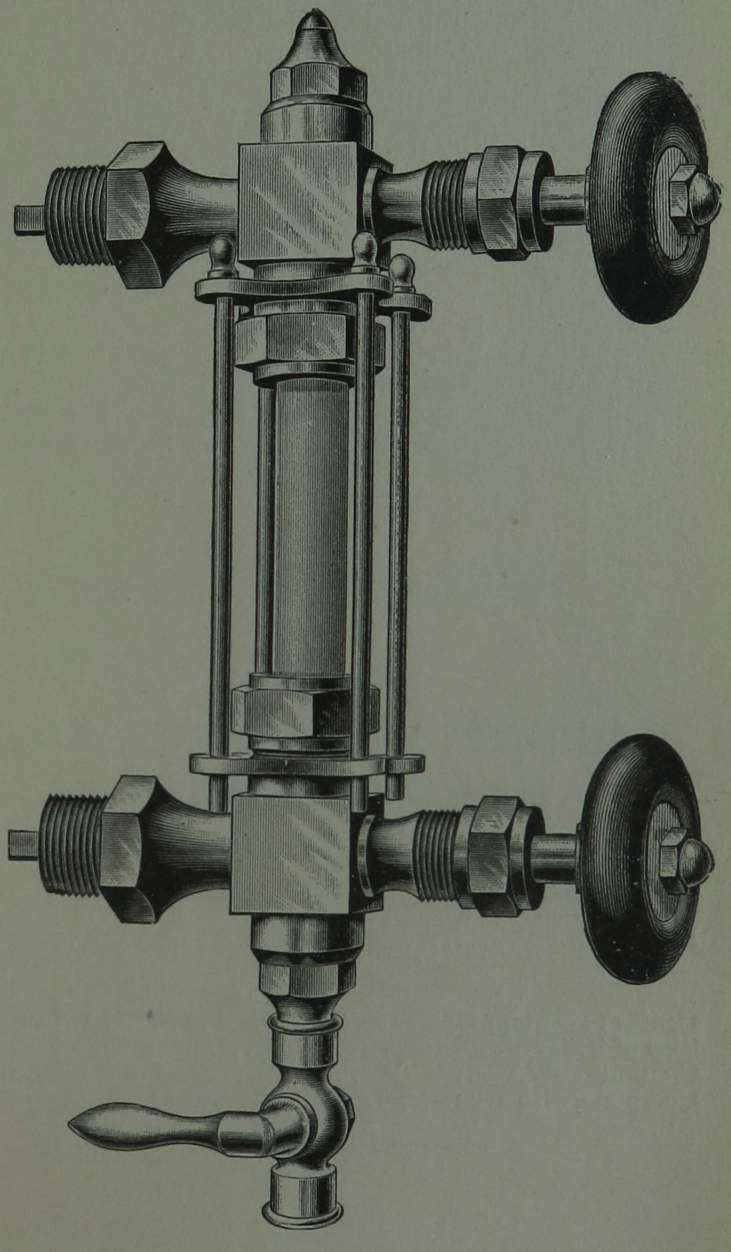
STEAM METAL,

WITH TWO GUARDS.

LIST.

Numbers.			With Iron Wheels.	With Wood Wheels.
1	Glass ½ x 10 inches, ⅜-inch iron pipe	Each,	$2 75	$3 50
2	Glass ⅝ x 12 inches, ½-inch iron pipe	Each,	3 00	3 75
3	Glass ¾ x 16 inches, ¾-inch iron pipe	Each,	4 50	5 25



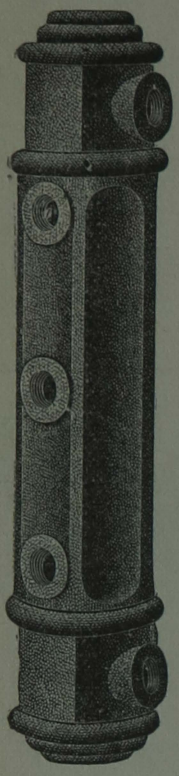


WITH FOUR GUARDS.

LIST.

Numbers.			Price.
15	Wood Wheels, Glass ⅝ x 12 inches, cut for ½-inch pipe	Each,	$6 00
16	Wood Wheels, Glass ¾ x 16 inches, cut for ¾-inch pipe	Each,	7 50

WATER COLUMNS.

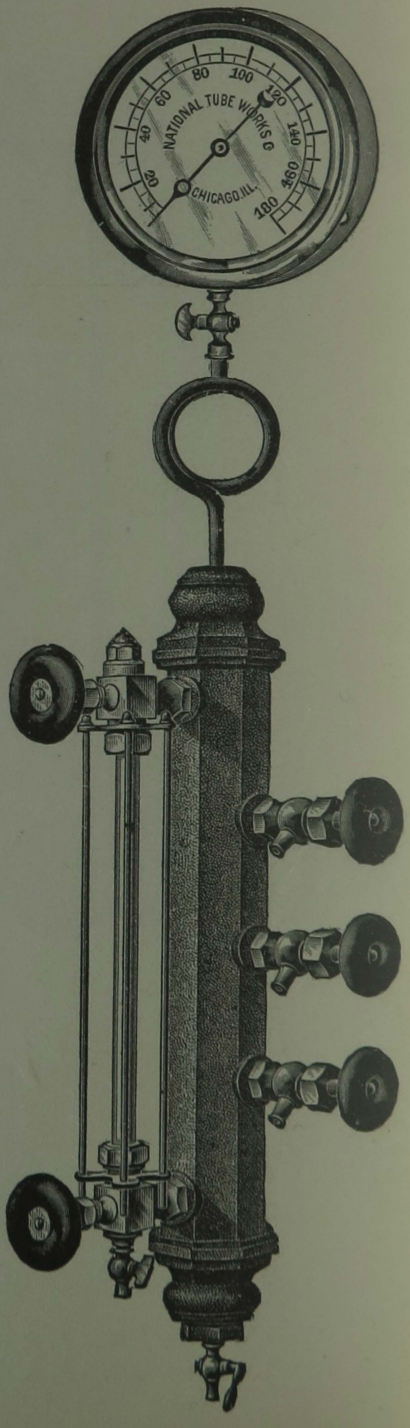


LIST.

Numbers	0	1	2	3	4	5	6
Center to center of boiler connections....Inches	...	10	12½	14	18	..	.....
Center to center of water gauge connections In.	9½	10	12½	14	18	13⅜	27
Center to center of gauge cocks.....Inches	0	3⅜	3¾	4½	4	3⅝	4¾
Extreme length.....Inches	12½	13	16½	18¾	22½	20¼	30¼
Tapped for boiler connections.....Inches	¾	½	¾	¾	1¼	1¼	1¼
Tapped for water gauge connections.....Inches	⅜	½	½	¾	¾	½	¾
Tapped for gauge cocks.....Inches	0	⅜	½	½	¾	½	¾
Top and bottom tapped.....Inches	¼x¾	¾	1	¾	1¼	1¼	1¼
Columns only.....Each	$1 50	3 50	5 00	7 50	10 50	7 50	12 00

No. 0 is designed especially for house heating boilers and has no holes for gauge cocks.

▭ With Nos. 4, 5 and 6 the connection to boiler is made from top and bottom of column.



STEAM OR WATER GAUGE COLUMNS.

LIST.

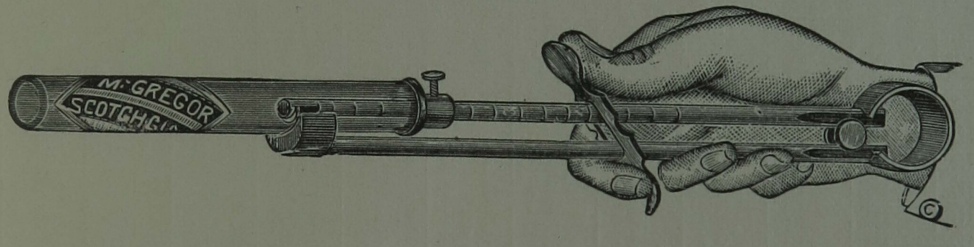
Numbers	1	2	3	4
Center to center of boiler connections. Inches	10	12½	14	18
Size of boiler connections.....Inches	½	¾	¾	1¼
Columns only.....Each	$ 3 50	5 00	7 50	10 50
Complete with trimmings .....Each	20 00	35 00	45 00	50 00

SCOTCH GLASS TUBES.

FOR WATER GAUGES.

LIST.

Diameter. Inches.	LENGTH, INCHES.																
	10	11	12	13	14	15	16	17	18	19	20	22	24	30	36	48	60
½	$0 40	$0 40	$0 45	$0 45	$0 50	$0 55	$0 60	$0 65	$ 70	$ 75	$ 80	$ 90	$1 00	$1 40	$1 90	$2 00	$3 00
⅝	40	40	45	45	50	55	60	65	70	75	80	90	1 00	1 40	1 90	2 00	3 00
¾	55	55	55	55	60	60	65	70	75	80	85	95	1 05	1 50	2 00	3 00	4 00
1	90	90	90	90	90	90	90	95	1 00	1 10	1 25	1 50	2 00	2 60	3 25	5 00	6 00



CHESTERTON'S GLASS TUBE CUTTERS.

LIST.

Tube Cutter, complete, net.....Each, $2 00
Extra Cutter Wheels, net.....Each, 15

RUBBER GAUGE GLASS WASHERS.

Per dozen.....$0 25

EXTRA BRASS GUARDS.

FOR WATER GAUGES.

LIST.

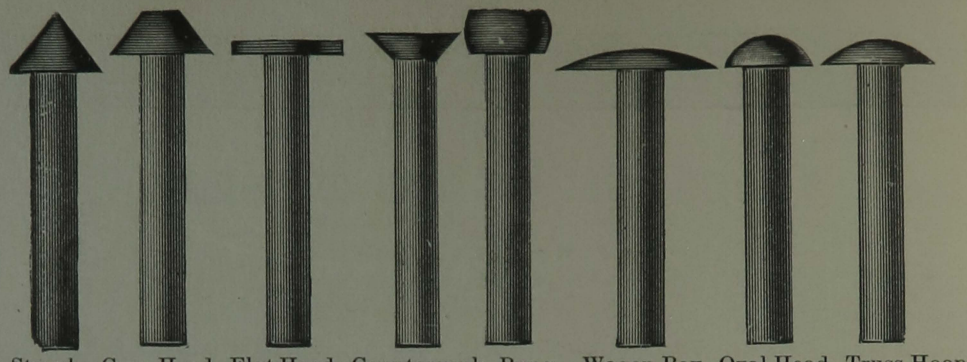
Length.....Inches,	14	16	18	20
Price, net.....Each,	$0 16	0 24	0 30	0 40

JENKINS DISCS FOR VALVES.

LIST.

Size.....Inches,	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Price.....	$0 03	0 04	0 04	0 05	0 06	0 09	0 12	0 18	0 24	0 33	0 45	0 52

Size.....Inches,	4½	5	6	7	8	10	12	14	16	18	20	24
Price.....	$0 60	0 68	0 90	0 98	1 20	1 75	2 25	3 00	4 00	5 00	6 00	9 00



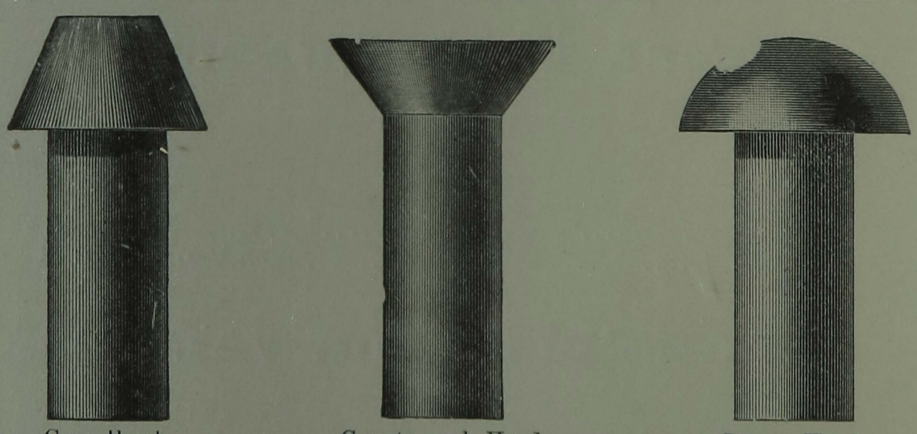
Steeple Head. Cone Head. Flat Head. Countersunk Head. Bung Head. Wagon Box Rivet. Oval Head. Truss Hoop Head.

RIVETS IN BULK.

Any Style of Head.

LIST.

Size. Inches.	PRICE, PER POUND. LENGTH OF RIVETS, INCHES.													
	1/2 and longer	15/32	7/16	13/32	3/8	11/32	5/16	9/32	1/4	7/32	3/16	5/32	1/8	3/32
7/16, 3/8, 11/32	$0 15	$0 16	$0 16	....	....	....	....	....	....	....	....	....	....	....
5/16	15½	16½	16½	$0 16½	$0 16½	.	....	....	....	....	....	....	....	....
1	15½	16½	16½	16½	16½	$0 16½	....	....	....	....	....	....	....	....
2	15½	16½	16½	16½	16½	17	$0 17	....	....	....	....	....	....	....
3	15½	16	17	17	17	17	18	$0 18	$0 18	....	....	....	....	....
1/4	15½	16	17	17	17	17	18	18	18	$0 19	$0 19	....	....	....
4	15½	17	17	18	18	18	18	18	18	19	19	$0 20	....	
5	16	17	18	18	18	18	19	20	20	21	21	22	$0 22	$0 23
6	16	17	18	18	19	19	20	20	21	22	23	23	23	24
3/16	16	17	18	18	19	19	20	20	21	22	23	24	25	26
7	16½	18	18	18	19	19	20	20	21	22	23	24	25	26
8	17	18	19	19	20	20	21	21	22	23	24	25	26	27
9	18	19	20	20	21	21	23	23	23	24	25	27	29	30
10	19	20	21	22	23	25	27	28	28	30	33	35	37	38
11	20	22	24	26	27	28	30	31	31	33	37	40	42	45
12	21	24	26	28	29	30	32	34	35	36	41	45	50	55
13	25	27	30	33	34	35	37	39	40	41	45	50	55	60
14	27	30	35	38	40	45	50	52	55	58	58	60	63	65



Cone Head. Countersunk Head. Button Head.

TANK AND BRIDGE RIVETS.

Quality and finish guaranteed. In ordering, specify head wanted. Packed in 200-pound kegs.

PRICES ON APPLICATION.

DRIFT BOLTS.

ROUND OR SQUARE.

With or without Heads or Points, as may be ordered.

PRICES ON APPLICATION.

BOAT SPIKES.

All sizes.....Per pound, $.....

PRICES ON APPLICATION.

TINNERS' RIVETS.

FLAT HEAD.

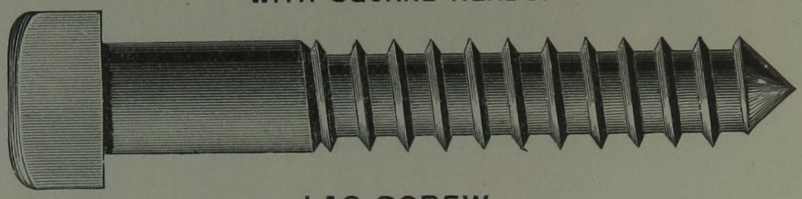
LIST.

SIZE.		IN PACKAGES OF 1000. Price per 1000.		IN BULK. Price per Pound.	
Ounces.	Pounds.	Black.	Tinned.	Black.	Tinned.
8	....	$ 20	$ 24	$ 0 38	$ 0 45
10	....	22	25	34	40
12	....	24	28	31	37
14	....	26	30	29	35
....	1	27	33	26	32
....	1¼	29	37	23	29
....	1½	33	42	22	28
....	1¾	37	48	21	27
....	2	42	54	20	26
....	2½	55	69	20	26
....	3	60	78	19	25
....	3½	70	81	19	25
....	4	76	1 00	18	24
....	5	90	1 20	17	23
....	6	1 08	1 44	17	23
....	7	1 26	1 68	17	23
....	8	1 44	1 92	17	23
....	9	1 53	2 07	16	22
....	10	1 75	2 35	16	22
....	12	1 98	2 70	15½	21½
....	14	2 31	3 15	15½	21½
....	16	2 64	3 60	15½	21½

Oval or countersunk heads, or extra lengths, 5 cents per 1000 in addition to the above prices.

COACH AND LAG SCREWS.

WITH SQUARE HEADS.



LAG SCREW.

MANUFACTURERS' STANDARD LIST.

Adopted January 30, 1895. To take effect February 14, 1895.

LIST.

Length. Inches.	DIAMETER, INCHES.						
	1/4 and 5/16 Inch.	3/8 Inch.	7/16 Inch.	1/2 Inch.	9/16 and 5/8 Inch.	3/4 Inch.	7/8 Inch.	1 Inch.
1½	$2 25	$2 70	$3 15	$3 75	.....	.....	.....	.....
2	2 40	2 88	3 39	4 05	$ 4 95	.....	.....	.....
2½	2 55	3 06	3 63	4 35	5 40	$ 7 92	.....	.....
3	2 70	3 24	3 87	4 65	5 85	8 58	$12 30	.....
3½	2 85	3 42	4 11	4 95	6 30	9 24	13 20	$18 60
4	3 00	3 60	4 35	5 25	6 75	9 90	14 10	19 80
4½	3 15	3 78	4 59	5 55	7 20	10 56	15 00	21 00
5	3 30	3 96	4 83	5 85	7 65	11 22	15 90	22 20
5½	3 45	4 14	5 07	6 15	8 10	11 88	16 80	23 40
6	3 60	4 32	5 31	6 45	8 55	12 54	17 70	24 60
6½	3 75	4 50	5 55	6 75	9 00	13 20	18 60	25 80
7	3 90	4 68	5 79	7 05	9 45	13 86	19 50	27 00
7½	4 05	4 86	6 03	7 35	9 90	14 52	20 40	28 20
8	4 20	5 04	6 27	7 65	10 35	15 18	21 30	29 40
9	4 50	5 40	6 75	8 25	11 25	16 50	23 10	31 80
10	4 80	5 76	7 23	8 85	12 15	17 82	24 90	34 20
11	5 10	6 12	7 71	9 45	13 05	19 14	26 70	36 60
12	5 40	6 48	8 19	10 05	13 95	20 46	28 50	39 00

IRON WOOD SCREWS.

LIST.

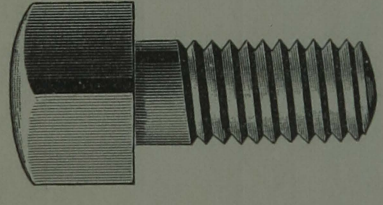
Inches.	NUMBERS.																				
	0&1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	22	24
1/4	$0 40	0 40	0 40	0 40	...	....	...	....	..	....	....	....	....	....	....	....	..	....	....	....	....
3/8	40	40	40	40	0 40	41	48	55	62	....	....	...	....	..	....	....	....	....	...	....	....
1/2	40	40	40	40	41	45	52	59	66	73	80	87	....	....	....	....	....	...	....	....	....
5/8	40	40	40	40	43	49	56	63	70	77	84	91	98	1 10	....	.	....	....	....	....	....
3/4	.....	40	41	41	46	53	60	67	74	81	88	95	1 05	1 20	1 35	1 55	....	...	....	....	....
7/8	.....	41	44	48	52	59	66	73	80	87	94	1 00	1 15	1 30	1 50	1 70		.	....	....	....
1	.....	....	51	55	59	66	73	80	87	94	1 00	1 10	1 25	1 40	1 60	1 80	2 00	2 20	2 70	....	...
1¼	...	...	....	62	68	74	80	87	94	1 00	1 10	1 20	1 35	1 55	1 75	1 95	2 15	2 35	2 85	3 35	3 95
1½	.....	....	...	70	76	82	88	94	1 00	1 10	1 20	1 30	1 50	1 70	1 90	2 10	2 30	2 50	3 00	3 50	4 15
1¾	.....	...	...	....	....	92	98	1 05	1 10	1 20	1 30	1 45	1 65	1 85	2 05	2 25	2 45	2 70	3 20	3 75	4 35
2	.....	....	....	...	....	1 05	1 10	1 20	1 25	1 30	1 40	1 55	1 80	2 00	2 20	2 40	2 60	2 90	3 40	4 00	4 55
2¼	.....	....	....	....	....	....	...	1 30	1 35	1 45	1 50	1 70	1 90	2 10	2 35	2 60	2 80	3 05	3 60	4 20	4 80
2½	....	....	....	....	....	..	...	1 55	1 60	1 70	1 75	1 85	2 05	2 25	2 55	2 75	3 00	3 30	3 85	4 50	5 10
2¾	....	....	....	....	....	....	....	....	...	2 05	2 10	2 15	2 25	2 45	2 70	2 95	3 25	3 60	4 25	5 00	5 60
3	....	....	....	....	...	....	...	....	...	2 35	2 40	2 45	2 55	2 65	2 95	3 30	3 65	4 05	4 80	5 55	6 40
3½	....	....	....	....	...	....	...	....	....	3 30	3 40	3 50	3 60	3 70	3 80	3 90	4 30	4 75	5 55	6 35	7 30
4	.....	....	....	....	....	....	...	....	..	....	....	4 50	....	4 60	....	4 75	....	5 60	6 40	7 30	8 40
4½	.....	....	....	....	....	....	....	....	....	...	....	...	....	....	....	6 40	....	6 60	7 40	8 45	9 70
5	.....	....	..	...	..	....	....	..	....	...	....	....	....	....	...	....	....	8 20	8 60	9 75	1105
6	. ..	....	....	....	...	..	....	...	....	....	....	...	..	...	....	...	....	....	1175	1250	1350

ROUND AND FLAT HEAD MACHINE SCREWS.

LIST.

Per Gross.

Threads to Inch.	56	48	32 36 40		30	32		24 30 32		20	24	16 18 20	16	18		14	16		
Numbers.	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	24	26	28	30
Lengths.																			
3/16	$0 55	0 55	0 55	0 55	0 55	....	.	....	....	...	....	....	....	...	....	....	....	....	...
1/4	55	55	55	55	55	0 65	65	75	75	....	...	....	..	....	....	...	...	....	....
5/16	55	55	55	55	55	65	65	75	75	....	.	....	....	....	...	..	..	....	....
3/8	55	55	55	55	55	65	65	75	75	85	95	1 05	....	....	....	....	....	....	....
7/16	55	55	55	55	55	65	65	75	75	85	95	1 05	..	....		....	....	....	....
1/2	55	55	55	55	55	65	65	75	75	85	95	1 05	1 15	1 20	1 35	1 50	...	....	...
9/16	60	60	60	60	60	65	65	75	75	85	95	1 05	1 15	1 20	1 35	1 50	....	....	....
5/8	.....	60	60	60	60	65	65	75	75	85	95	1 05	1 15	1 20	1 35	1 50	....	....	....
3/4	.....	....	65	65	65	65	65	75	75	85	95	1 05	1 20	1 25	1 40	1 50	1 60	...	....
7/8	.....	....	....	75	75	75	75	85	85	95	1 05	1 10	1 25	1 30	1 50	1 60	1 70	1 90	....
1	.....	....	....	....	85	85	85	95	95	95	1 10	1 15	1 30	1 35	1 60	1 70	1 90	2 10	2 35
1 1/8	.....	....	...	....	....	95	95	95	95	1 00	1 15	1 20	1 30	1 40	1 70	1 80	2 00	2 20	2 50
1 1/4	.....	....	....	....	...	....	1 00	1 00	1 00	1 00	1 20	1 25	1 35	1 45	1 80	1 90	2 00	2 30	2 60
1 3/8	....	....	....	...	....	....	....	1 10	1 10	1 20	1 25	1 30	1 40	1 50	1 90	2 00	2 10	2 40	2 70
1 1/2	.....	....	..	....	....	....	....	....	1 10	1 20	1 30	1 35	1 45	1 60	1 90	2 00	2 15	2 45	2 75
1 3/4	.....	....	....	....	...	...	....	....	....	1 30	1 40	1 50	1 60	1 70	2 00	2 15	2 30	2 60	2 90
2	....	....	....	....	....	....	...	....	....	..	1 50	1 60	1 70	1 90	2 15	2 30	2 45	2 75	3 10
2 1/4	.....	....	....	....	....	....	....	....	....	...	....	1 75	1 90	2 00	2 20	2 45	2 60	2 90	3 40
2 1/2	.....	....	....	....	....	..	....	....	....	....	....	....	2 00	2 15	2 40	2 60	2 75	3 10	3 80
2 3/4	.....	....	....	....	....	....	....	....	....	...	....	....	....	2 30	2 50	2 75	2 90	3 40	4 20
3	....	....	....	....	....	....	....	....	...	....	....	...	...	....	2 75	2 90	3 10	3 80	4 60
Diameter About.	5/64	3/32	7/64	1/8	9/64 scant	9/64 full.	5/32	11/64	3/16	7/32	1/4	17/64	9/32	5/16	11/32	3/8	25/64	27/64	29/64



HEXAGON HEAD CAP SCREWS.

CASE HARDENED.

LIST.

Length under Head to Extreme Point. Inches.	DIAMETER OF SCREW, INCHES.											
	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4
3/4	$3 00	$3 25	$3 75	$4 40	$5 50	$ 7 00	.....	.....	.....	.....	.....	.....
1	3 25	3 50	4 00	4 70	5 70	7 00	$9 50	.....	.....	.....	.....	....
1 1/4	3 50	3 75	4 25	5 00	6 00	7 50	9 50	$12 20	.....	.....	.....	....
1 1/2	3 75	4 00	4 50	5 30	6 30	8 00	10 00	12 20	$16 00	.....	.....	.....
1 3/4	4 00	4 25	4 75	5 60	6 60	8 50	10 60	12 80	16 60	$21 20	.....	.....
2	4 25	4 60	5 05	5 95	7 00	9 10	11 20	13 40	17 20	22 30	$29 00	$37 50
2 1/4	4 55	5 00	5 40	6 35	7 50	9 70	11 90	14 10	17 90	23 60	30 50	39 30
2 1/2	4 85	5 40	5 80	6 80	8 00	10 40	12 70	14 90	18 80	25 10	32 30	41 40
2 3/4	5 15	5 80	6 30	7 30	8 60	11 20	13 60	15 90	20 00	26 90	34 40	44 00
3	5 45	6 20	6 80	7 90	9 30	12 10	14 70	17 00	21 80	29 00	37 00	47 50
Threads to Inch.....	20	18	16	14	12	12	11	10	9	8	7	7
Add for each 1/4 Inch	$0 30	0 40	0 50	0 60	0 80	1 00	1 30	1 60	2 00	2 40	3 00	4 00

CASE HARDENED IRON SET SCREWS.

LIST.

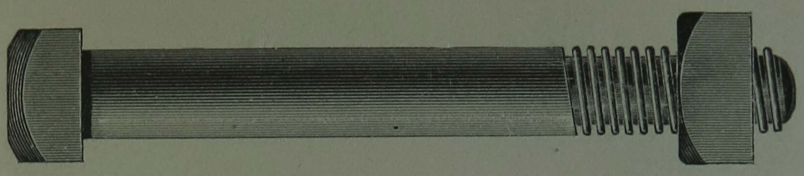
Length. Inches.	DIAMETER OF SCREW, INCHES.											
	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4
3/4	$ 2 00	$ 2 20	$ 2 50	$ 2 90	$ 3 40	$ 4 25	$ 5 00	....	....	....	....	....
1	2 15	2 35	2 65	3 10	3 60	4 25	5 00	$ 7 00	....	....	....	....
1 1/4	2 30	2 50	2 80	3 30	3 80	4 50	5 25	7 00	$11 30	....	....	....
1 1/2	2 45	2 65	2 95	3 50	4 00	4 75	5 50	7 50	11 30	$14 90	....	....
1 3/4	2 60	2 80	3 10	3 70	4 20	5 00	5 75	8 00	12 00	15 90	$19 50	....
2	2 80	3 00	3 30	3 95	4 45	5 30	6 05	8 60	12 90	17 00	21 10	$25 30
2 1/4	3 05	3 25	3 55	4 25	4 75	5 65	6 40	9 30	13 80	18 40	22 90	27 40
2 1/2	3 30	3 55	3 85	4 60	5 10	6 05	6 80	10 00	14 80	19 80	24 70	29 60
2 3/4	3 55	3 85	4 20	5 00	5 50	6 50	7 25	10 80	15 90	21 40	26 70	32 00
3	3 80	4 15	4 55	5 45	5 95	7 00	7 75	11 70	17 10	23 00	28 80	34 60
3 1/4	....	4 45	4 90	5 90	6 45	7 55	8 35	12 70	18 40	24 70	31 00	37 40
3 1/2	....	....	5 25	6 35	6 95	8 10	8 95	13 70	19 70	26 40	33 20	40 20
3 3/4	....	....	....	6 80	7 45	8 65	9 55	14 70	21 00	28 10	35 40	43 00
4	....	....	....	....	7 95	9 20	10 15	15 70	22 30	29 80	37 60	45 80
4 1/4	....	....	....	....	....	9 75	10 75	16 70	23 60	31 50	39 80	48 60
4 1/2	....	....	....	....	....	....	11 35	17 70	24 90	33 20	42 00	51 40
4 3/4	....	....	....	....	....	....	....	18 70	26 20	34 90	44 20	54 20
5	....	....	....	....	....	....	....	....	27 50	36 60	46 40	57 00
Threads To Inch.	20	18	16	14	12	12	11	10	9	8	7	7
Add for Each 1/4 Inch.	$ 0 25	0 30	0 35	0 45	0 50	0 55	0 60	1 00	1 30	1 70	2 20	2 80

BOILER PATCH BOLTS.

TURNED AND THREADED.

LIST.

Length from Largest Diameter of Bevel to Point. Inches.	DIAMETER, INCHES.				
	1/2	5/8	3/4	7/8	1
3/4	$ 3 75	$ 4 25	....	....	....
7/8	4 00	4 50	$ 6 00	....	....
1	4 25	4 80	6 50	$ 9 50	$13 50
1 1/8	....	5 10	6 80	9 85	14 00
1 1/4	....	5 50	7 25	10 25	14 75
Threads to inch.....	14	12	12	12	12



MACHINE BOLTS.

WITH SQUARE HEADS AND SQUARE NUTS.

FINISHED POINTS.

Adopted June 11, 1896. To take effect July 1, 1896.

LIST.

Length. Inches.	DIAMETER, INCHES.										
	¼	5/16	⅜	7/16	½	9/16 and ⅝	¾	⅞	1	1⅛	1¼
1½	$1 70	$2 00	$2 40	$2 80	$3 60	$ 5 20	$ 7 20	$10 00	$14 40	$22 50	$30 00
2	1 78	2 10	2 52	2 96	3 80	5 50	7 64	10 60	15 20	23 55	31 35
2½	1 86	2 20	2 64	3 12	4 00	5 80	8 08	11 20	16 00	24 60	32 70
3	1 94	2 30	2 76	3 28	4 20	6 10	8 52	11 80	16 80	25 65	34 05
3½	2 02	2 40	2 88	3 44	4 40	6 40	8 96	12 40	17 60	26 70	35 40
4	2 10	2 50	3 00	3 60	4 60	6 70	9 40	13 00	18 40	27 75	36 75
4½	2 18	2 60	3 12	3 76	4 80	7 00	9 84	13 60	19 20	28 80	38 10
5	2 26	2 70	3 24	3 92	5 00	7 30	10 28	14 20	20 00	29 85	39 45
5½	2 34	2 80	3 36	4 08	5 20	7 60	10 72	14 80	20 80	30 90	40 80
6	2 42	2 90	3 48	4 24	5 40	7 90	11 16	15 40	21 60	31 95	42 15
6½	2 50	3 00	3 60	4 40	5 60	8 20	11 60	16 00	22 40	33 00	43 50
7	2 58	3 10	3 72	4 56	5 80	8 50	12 04	16 60	23 20	34 05	44 85
7½	2 66	3 20	3 84	4 72	6 00	8 80	12 48	17 20	24 00	35 10	46 20
8	2 74	3 30	3 96	4 88	6 20	9 10	12 92	17 80	24 80	36 15	47 55
9	2 90	3 50	4 20	5 20	6 60	9 70	13 80	19 00	26 40	38 25	50 25
10	3 06	3 70	4 44	5 52	7 00	10 30	14 68	20 20	28 00	40 35	52 95
11	3 22	3 90	4 68	5 84	7 40	10 90	15 56	21 40	29 60	42 45	55 65
12	3 38	4 10	4 92	6 16	7 80	11 50	16 44	22 60	31 20	44 55	58 35
13	.....	.....	5 16	6 48	8 20	12 10	17 32	23 80	32 80	46 65	61 05
14	.....	.....	5 40	6 80	8 60	12 70	18 20	25 00	34 40	48 75	63 75
15	.....	.....	5 64	7 12	9 00	13 30	19 08	26 20	36 00	50 85	66 45
16	.....	.....	5 88	7 44	9 40	13 90	19 96	27 40	37 60	52 95	69 15
17	.....	.....	.....	.....	9 80	14 50	20 84	28 60	39 20	55 05	71 85
18	.....	.....	.....	.....	10 20	15 10	21 72	29 80	40 80	57 15	74 55
19	.....	.....	.....	.....	10 60	15 70	22 60	31 00	42 40	59 25	77 25
20	.....	.....	.....	.....	11 00	16 30	23 48	32 20	44 00	61 35	79 95
21	.....	.....	.....	.....	....	.....	24 36	33 40	45 60	63 45	82 65
22	.....	.....	.....	.....	....	.....	25 24	34 60	47 20	65 55	85 35
23	.....	.....	.....	.....	....	.....	26 12	35 80	48 80	67 65	88 05
24	.....	.....	.....	.....	....	.....	27 00	37 00	50 40	69 75	90 75
25	.....	.....	.....	.....	.....	.....	27 88	38 20	52 00	71 85	93 45
26	.....	.....	.....	.....	....	.....	28 76	39 40	53 60	73 95	96 15
27	.....	.....	.....		....	.....	29 64	40 60	55 20	76 05	98 85
28	.....	.....	.....	.....	.....	.....	30 52	41 80	56 80	78 15	101 55
29	.....	.....	.....	....	.....	.....	31 40	43 00	58 40	80 25	104 25
30	.....	.....	.....	.....	....	.....	32 28	44 20	60 00	82 35	106 95

The following extras are to be understood as a part of this list:

Bolts with Hexagon Heads or Hexagon Nuts, 10 per cent. extra.

If both Hexagon Heads and Hexagon Nuts, 20 per cent. extra.

Joint Bolts with Oblong Nuts, Bolts with Tee Heads, Askew Heads, and Eccentric Heads, 10 per cent. extra.

For prices extra nuts and extra lengths of thread, see standard list.

Special bolts with irregular threads and unusual dimensions of heads or nuts will be charged extra at the discretion of the manufacturer.

COMMON CARRIAGE BOLTS.

WITH SHORT FULL SIZE SQUARE UNDER HEADS, FORGED NUTS AND FINISHED POINTS.

Adopted January 30, 1895. To take effect February 14, 1895.

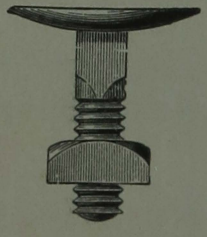
LIST.

Length. Inches.	DIAMETER, INCHES.						
	3/16 and 1/4	5/16	3/8	7/16	1/2	9/16 and 5/8	3/4
1½	$1 00	$1 20	$1 50	$2 20	$3 00	$5 00	$7 20
1¾	1 04	1 25	1 50	2 20	3 00	5 00	7 20
2	1 08	1 30	1 50	2 20	3 00	5 00	7 20
2¼	1 12	1 35	1 57	2 28	3 00	5 00	7 20
2½	1 16	1 40	1 64	2 36	3 00	5 00	7 20
2¾	1 20	1 45	1 71	2 44	3 00	5 00	7 20
3	1 24	1 50	1 78	2 52	3 00	5 00	7 20
3¼	1 28	1 55	1 85	2 60	3 10	5 15	7 40
3½	1 32	1 60	1 92	2 68	3 20	5 30	7 60
3¾	1 36	1 65	1 99	2 76	3 30	5 45	7 80
4	1 40	1 70	2 06	2 84	3 40	5 60	8 00
4¼	1 44	1 75	2 13	2 92	3 50	5 75	8 20
4½	1 48	1 80	2 20	3 00	3 60	5 90	8 40
4¾	1 52	1 85	2 27	3 08	3 70	6 05	8 60
5	1 56	1 90	2 34	3 16	3 80	6 20	8 80
5½	1 64	2 00	2 48	3 32	4 00	6 50	9 20
6	1 72	2 10	2 62	3 48	4 20	6 80	9 60
6½	1 80	2 20	2 76	3 64	4 40	7 10	10 00
7	1 88	2 30	2 90	3 80	4 60	7 40	10 40
7½	1 96	2 40	3 04	3 96	4 80	7 70	10 80
8	2 04	2 50	3 18	4 12	5 00	8 00	11 20
8½	2 12	2 60	3 32	4 28	5 20	8 30	11 60
9	2 20	2 70	3 46	4 44	5 40	8 60	12 00
9½	2 28	2 80	3 60	4 60	5 60	8 90	12 40
10	2 36	2 90	3 74	4 76	5 80	9 20	12 80
11	2 52	3 10	4 02	5 08	6 20	9 80	13 60
12	2 68	3 30	4 30	5 40	6 60	10 40	14 40
13	2 84	3 50	4 58	5 72	7 00	11 00	15 20
14	3 00	3 70	4 86	6 04	7 40	11 60	16 00
15	3 16	3 90	5 14	6 36	7 80	12 20	16 80
16	3 32	4 10	5 42	6 68	8 20	12 80	17 60
17	3 48	4 30	5 70	7 00	8 60	13 40	18 40
18	3 64	4 50	5 98	7 32	9 00	14 00	19 20
19	3 80	4 70	6 26	7 64	9 40	14 60	20 00
20	3 96	4 90	6 54	7 96	9 80	15 20	20 80

STOVE BOLTS.

LIST.

Length. Inches.	FLAT HEAD STOVE BOLTS. Diameter, Inches.					ROUND HEAD STOVE BOLTS. Diameter, Inches.				
	5/32 and 3/16 Inch.	7/32 Inch.	1/4 Inch.	5/16 Inch.	3/8 Inch.	5/32 and 3/16 Inch.	7/32 Inch.	1/4 Inch.	5/16 Inch.	3/8 Inch.
3/8	$ 60	....	....	....	....	....	....	....	....	....
1/2	60	$ 62	$ 65	....	....	$ 85	$ 90	$ 95	$1 35	$2 50
5/8	60	62	65	....	.	85	90	95	1 35	2 50
3/4	60	62	65	$1 05	$2 20	85	90	95	1 35	2 50
7/8	65	67	70	1 10	2 20	90	95	1 00	1 40	2 55
1	65	67	70	1 10	2 20	90	95	1 00	1 45	2 60
1 1/8	70	72	75	1 15	2 20	95	1 00	1 05	1 50	2 65
1 1/4	70	72	75	1 15	2 20	95	1 00	1 05	1 55	2 70
1 3/8	75	77	80	1 20	2 20	1 00	1 05	1 10	1 60	2 75
1 1/2	75	77	80	1 20	2 20	1 00	1 05	1 10	1 65	2 80
1 3/4	80	82	85	1 25	2 20	1 05	1 10	1 15	1 70	2 85
2	85	87	90	1 30	2 20	1 10	1 15	1 20	1 75	2 90
2 1/4	90	92	95	1 35	2 30	1 15	1 20	1 25	1 80	3 00
2 1/2	95	97	1 00	1 40	2 40	1 20	1 25	1 30	1 85	3 10
2 3/4	1 00	1 02	1 05	1 45	2 50	1 25	1 30	1 35	1 90	3 20
3	1 05	1 07	1 10	1 50	2 60	1 30	1 35	1 40	1 95	3 30
3 1/2	1 15	1 17	1 20	1 60	2 80	1 40	1 45	1 50	2 05	3 50
4	1 25	1 27	1 30	1 70	3 00	1 50	1 55	1 60	2 15	3 70
4 1/2	1 35	1 37	1 40	1 80	3 20	1 60	1 65	1 70	2 25	4 00
5	1 45	1 47	1 50	1 90	3 40	1 70	1 75	1 80	2 35	4 10
5 1/2	1 55	1 57	1 60	2 00	3 60	1 80	1 85	1 90	2 45	4 30
6	1 65	1 67	1 70	2 10	3 80	1 90	1 95	2 00	2 55	4 50
6 1/2	1 75	....	1 80	2 20	4 00	2 00	2 05	2 10	2 65	4 70

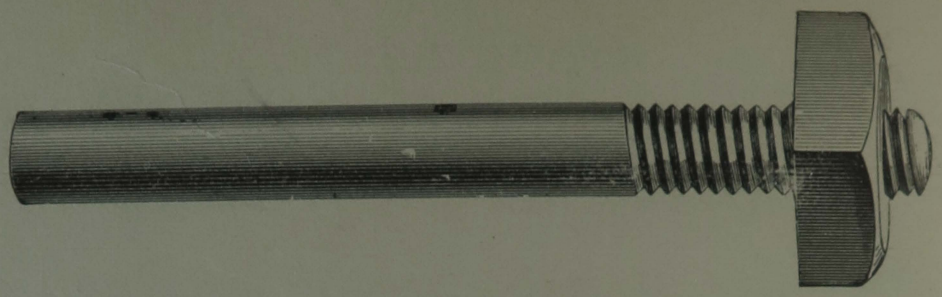


ELEVATOR BOLTS.

WROUGHT IRON.

LIST.

OVAL HEADS. 3/16 and 1/4 inch.		KEY HEADS. 3/16 and 1/4 Inch.		LARGE COUNTERSUNK HEADS.					
				3/16 and 1/4 Inch.		5/16 Inch.		3/8 Inch.	
Length. Inches.	Price.	Length. Inches.	Price.	Length. Inches.	Price.	Length. Inches.	Price.	Length. Inches.	Price.
3/4	$1 50	3/4	$1 50	3/4	$2 20	1	$3 00	1	$4 00
7/8	1 60	7/8	1 60	7/8	2 30	1 1/4	3 20	1 1/4	4 30
1	1 60	1	1 60	1	2 30	1 1/2	3 40	1 1/2	4 60
1 1/8	1 70	1 1/4	1 80	1 1/4	2 40	. .	....	...	....
1 1/4	1 80	...	....	..	....	...	....	...	....



BOLT ENDS.

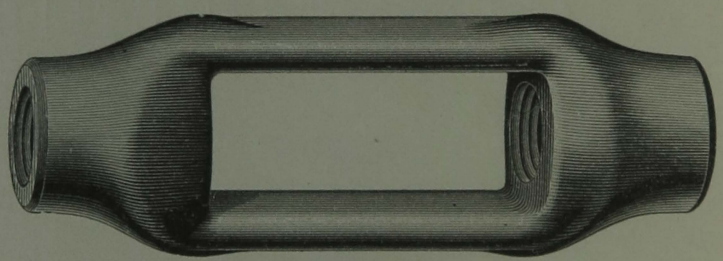
FITTED WITH SQUARE NUTS.

Adopted January 30, 1895. To take effect February 14, 1895.

LIST.

Size of Iron.....Inches,	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
Length.....Inches,	6	7	7	8	9	10	11	12
Price.....Per pound,	$0 20	0 18	0 16	0 14	0 12	0 10	0 10	0 10
Weight, per 100 Bolts.....Pounds,	15	22	31	45	90	140	212	310
Size of Iron.....Inches,	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2
Length.....Inches,	13	14	15	16	17	18	19	20
Price.....Per pound,	$0 10	0 11	0 11	0 11	0 12	0 12	0 12	0 12
Weight, per 100 Bolts.....Pounds,	420	550	720	940	1165	1405	1800	2045

With Hexagon Nuts, 10 per cent. extra. Bolt Ends ordered shorter than above standard lengths will be charged at price per hundred of machine bolts of same length, subject to same discount.



TURN BUCKLES.

LIST.

Size, Inches.	Price.	Size, Inches.	Price.
3/8	$ 40	1 7/8	$2 25
7/16	42	2	2 65
1/2	45	2 1/8	3 10
5/8	50	2 1/4	3 50
3/4	63	2 3/8	4 00
7/8	75	2 1/2	4 50
1	88	2 3/4	5 50
1 1/8	1 00	3	6 50
1 1/4	1 25	3 1/4	8 00
1 3/8	1 38	3 1/2	10 00
1 1/2	1 50	3 3/4	15 00
1 5/8	1 75	4	20 00
1 3/4	2 00		

All ordinary sizes carried in stock. Turn Buckles of any length made to order at short notice. Buckles without stub ends furnished when desired.

HOT PRESSED HEXAGON NUTS.

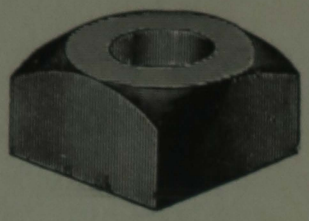
MANUFACTURERS' STANDARD.

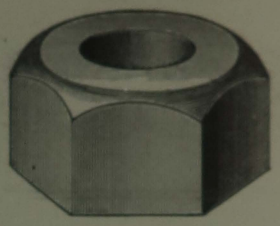
LIST.

Width. Inches.	Thickness. Inches.	Diameter of Hole. Inches.	Size of Bolt. Inches.	Price per Pound in 200 Pound Kegs. Cents.	Average Number in 100 Pounds.
1/2	1/4	7/32	1/4	20	8900
5/8	5/16	9/32	5/16	16	4300
3/4	3/8	11/32	3/8	13	2500
7/8	7/16	13/32	7/16	11.2	1600
1	1/2	7/16	1/2	10.5	1000
1 1/8	9/16	1/2	9/16	10.3	760
1 1/4	5/8	9/16	5/8	10	569
1 3/8	3/4	21/32	3/4	9.8	395
1 5/8	7/8	25/32	7/8	9.6	232
1 3/4	1	7/8	1	9.6	180
2	1 1/4	15/16	1 1/8	9.6	108
2 1/4	1 3/8	1 1/16	1 1/4	9.8	79
2 1/2	1 1/2	1 3/16	1 3/8	10	60
2 3/4	1 5/8	1 5/16	1 1/2	10.2	44
3	1 3/4	1 7/16	1 5/8	10.5	35
3 1/4	1 7/8	1 9/16	1 3/4	10.7	28
3 1/2	2	1 11/16	1 7/8	10.8	22
3 1/2	2	1 13/16	2	11	22
3 3/4	2 1/8	1 7/8	2 1/8	11.3	....
3 3/4	2 1/4	2	2 1/4	11.5	....
4	2 3/8	2 1/8	2 3/8	11.8	....
4 1/4	2 1/2	2 1/4	2 1/2	12.1	....
4 1/2	2 3/4	2 7/16	2 3/4	12.6	....
4 3/4	3	2 11/16	3	13.2	....
5	3 1/4	2 15/16	3 1/4	14.2	....
5 1/4	3 1/2	3 1/8	3 1/2	15.2	....

For lots of all kinds of Nuts less than one keg:

Add 10 cents per 100 pounds when wanted in 100-pound lots.
Add 25 cents per 100 pounds when wanted in 50-pound lots.
Add 40 cents per 100 pounds when wanted in 10-pound boxes.
Add 50 cents per 100 pounds when wanted in 5-pound boxes.





HOT PRESSED SQUARE AND HEXAGON NUTS.

U. S. STANDARD SIZES.

LIST.

Width. Inches.	Thickness. Inches.	Hole. Inches.	Size of Bolt. Inches.	Square. Price per Pound. Cents.	Average Number in 100 Pounds.	Hexagon. Price per Pound. Cents	Average Number in 100 Pounds.
1/2	1/4	3/16	1/4	13	6900	20	8000
19/32	5/16	1/4	5/16	12	3800	18	4600
11/16	3/8	19/64	3/8	10.5	2550	14	2950
25/32	7/16	11/32	7/16	10	1650	13	2000
7/8	1/2	13/32	1/2	9	1240	11.2	1450
31/32	9/16	29/64	9/16	9	870	11.2	1034
1 1/16	5/8	33/64	5/8	8.7	712	10.5	766
1 1/4	3/4	5/8	3/4	8.5	428	10	485
1 7/16	7/8	47/64	7/8	8.4	277	9.9	314
1 5/8	1	27/32	1	8.2	186	9.7	218
1 13/16	1 1/8	15/16	1 1/8	8.2	136	9.7	158
2	1 1/4	1 1/16	1 1/4	8.4	100	9.9	118
2 3/16	1 3/8	1 5/32	1 3/8	8 5	75	10	91
2 3/8	1 1/2	1 9/32	1 1/2	8.8	58	10.3	73
2 9/16	1 5/8	1 13/32	1 5/8	9	48	10.5	63
2 3/4	1 3/4	1 1/2	1 3/4	9.3	38	10.8	47
2 15/16	1 7/8	1 5/8	1 7/8	9.5	31	11	40
3 1/8	2	1 23/32	2	9.7	27	11.2	31
3 5/16	2 1/8	1 13/16	2 1/8	10	....	11.7	....
3 1/2	2 1/4	1 15/16	2 1/4	10	....	11.7	....
3 11/16	2 3/8	2 1/16	2 3/8	10.3	....	12.2	....
3 7/8	2 1/2	2 11/64	2 1/2	10.5	....	12.4	....
4 1/4	2 3/4	2 47/64	2 3/4	11	....	13	....
4 5/8	3	2 5/8	3	11.5	....	13.5	....

EXTRA COST OF THREADED NUTS.

IN 100 POUND LOTS.

ASSOCIATION STANDARD LIST.

LIST.

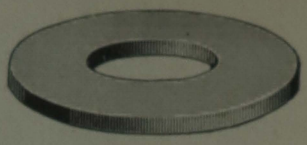
Size of Bolt. Inches.	Threads to Inch.	Square Nuts. Price per Pound, Net. Cents.	U. S. S. Square Nuts. Number in 100 Pounds.	Hexagon Nuts. Price per Pound, Net. Cents.	U. S. S. Hexagon Nuts. Number in 100 Pounds.
1/4	20	6	9700	9	10500
5/16	18	4.5	5900	7	6500
3/8	16	3.7	3250	6	3660
7/16	14	3	2230	4.5	2630
1/2	13	2 5	1485	3.5	1780
9/16	12	2 1	1050	2.8	1280
5/8	11	1.6	730	2.3	890
3/4	10	1.3	424	2	520
7/8	9	1.2	285	1.8	340
1	8	1.2	188	1.8	231
1 1/8	7	1.2	142	1.8	165
1 1/4	7	1.5	101	2.2	122
1 3/8	6	1.5	75	2.2	90
1 1/2	6	1.5	62	2.2	74
1 5/8	5 1/2	2.2	48	2.7	58
1 3/4	5	2.2	38	2.7	46
1 7/8	5	2.5	31	3 2	38
2	5	2.5	26	3.2	31
2 1/8	4 1/2	3	21	4	26
2 1/4	4 1/2	3	18 1/2	4	21 1/2

Left-hand threads extra.

CAST IRON WASHERS.

OF ANY PATTERN FURNISHED.

Price, per pound $0 05



IRON WASHERS.

MANUFACTURERS' STANDARD.

LIST.

Diameter. Inches.	Hole. Inches.	Thickness of Wire Gauge. Numbers.	Bolt. Inches.	Price per Pound in 200 Pound Kegs. Cents.	Number in 100 Pounds.
9/16	1/4	18	3/16	14	35200
3/4	5/16	16	1/4	12.2	15000
7/8	3/8	16	5/16	11 4	11900
1	7/16	14	3/8	10.5	7900
1 1/4	1/2	14	7/16	9.7	4500
1 3/8	9/16	12	1/2	9 2	3100
1 1/2	5/8	12	9/16	9.1	2156
1 3/4	11/16	10	5/8	9.	1323
2	13/16	10	3/4		1000
2 1/4	15/16	9	7/8	8.8	825
2 1/2	1 1/16	9	1		637
2 3/4	1 1/4	9	1 1/8		637
3	1 3/8	9	1 1/4	9	299
3 1/4	1 1/2	8	1 3/8		294
3 1/2	1 5/8	8	1 1/2	9.2	244
3 3/4	1 3/4	8	1 5/8		240
4	1 7/8	8	1 3/4	9.5	229
4 1/4	2	8	1 7/8		
4 1/2	2 1/8	8	2		82

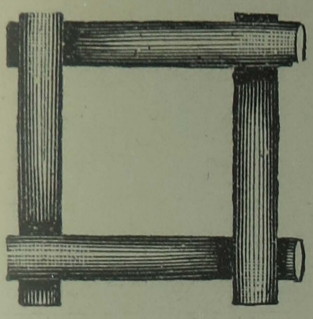
SQUARE WASHERS.

STANDARD SIZES.

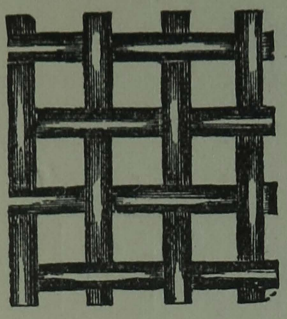
LIST.

Width. Inches.	Thickness. Inches.	Hole. Inches.	Bolt. Inches.	Price per Pound. Cents.	Number in 100 Pounds.
1 1/2	1/8	7/16	3/8	9.6	1300
1 3/4	1/8	1/2	7/16	9.1	1100
2	3/16	9/16	1/2	8.5	500
2 1/4	1/4	23/32	5/8	8.3	315
2 1/2	1/4	27/32	3/4	8.2	250
3	1/4	31/32	7/8	8.1	165
3 1/2	3/8	1 1/32	1	8.1	87
4	3/8	1 1/4	1 1/8	8.1	65
4 1/2	3/8	1 3/8	1 1/4	8.1	48
5	3/8	1 1/2	1 3/8	8 2	40
6	3/8	1 5/8	1 1/2	8.3	28
6 1/2	3/8	1 7/8	1 3/4	8.4	24
7	3/8	2 1/8	2	8.4	21

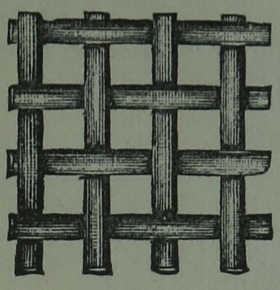
WIRE CLOTH.



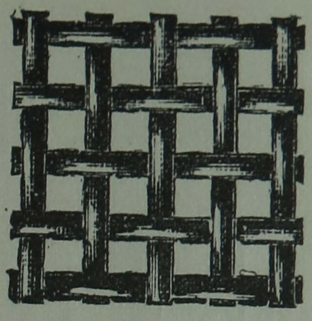
¾ Inch Space, No. 6 Wire.



No. 3 Mesh, No. 11 Wire.



No. 3½ Mesh, No. 12 Wire.



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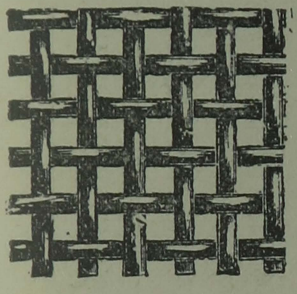
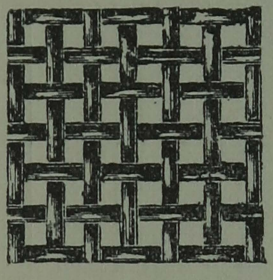
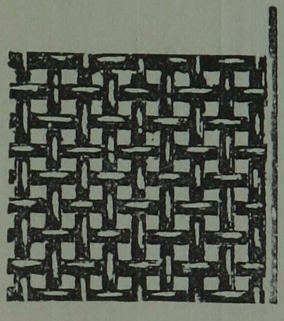


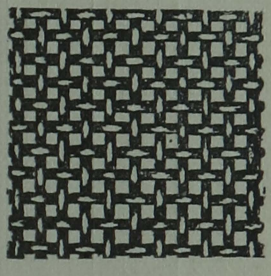
No. 5 Mesh, No. 13 Wire.



No. 6 Mesh, No. 14 Wire.



No. 8 Mesh, No. 16 Wire.



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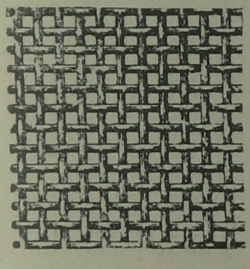

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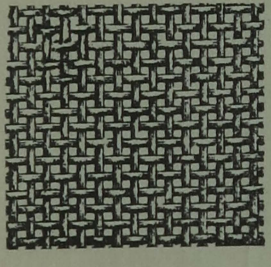

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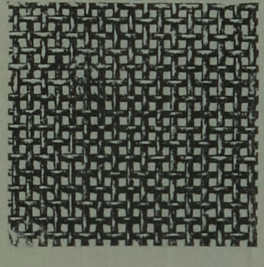

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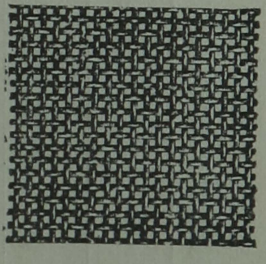
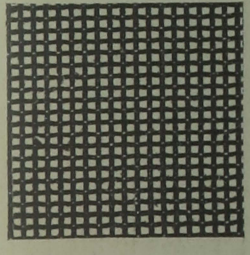
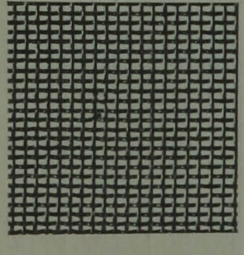


No. 18 Mesh, No. 23 Wire.



No. 20 Mesh, No. 24 Wire.



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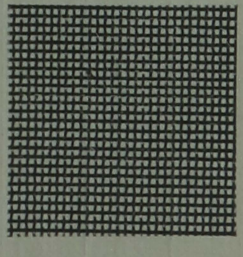
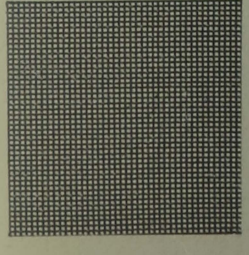
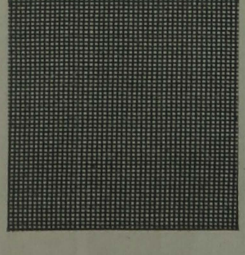


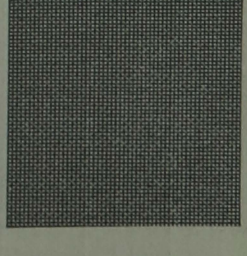
No. 30 Mesh, No. 28 Wire.



No. 40 Mesh, No. 31 Wire.



No. 50 Mesh, No. 36 Wire.



No. 60 Mesh.

WIRE CLOTH—Continued.

STEEL.

NO LENGTH LESS THAN 100 FEET SHALL BE UNDERSTOOD TO BE A ROLL.

The mesh in Wire Cloth is the distance from the center to the center of the wire per lineal inch.

LIST.

Mesh Number.	Wire Number.	Price per Square Foot.	Mesh Number.	Wire Number.	Price per Square Foot.	Mesh Number.	Wire Number.	Price per Square Foot.	Mesh Number.	Wire Number.	Price per Square Foot.	Mesh Number.	Wire Number.	Price per Square Foot.
1	3	$0 88	2½	13	$0 27	5	17	$0 27	10	19	$0 48	18	26	$0 27
1	4	73	2½	14	22	5	18	22	10	20	38	18	27	22
1	5	60	2½	15	17	5	19	17	10	21	32	18	28	17
1	6	48	2½	16	14	5	20	14	10	22	27	18	29	15
1	7	38	2½	17	12	5	21	12	10	23	22	18	30	13
1	8	32	2½	18	10	5	22	10	10	24	17	18	31	12
1	9	27	2½	19	8	5	23	8	10	25	14	18	32	11
1	10	22	3	10	60	5	24	7	10	26	12	18	33	10
1	11	17	3	11	48	6	14	60	10	27	10	18	34	9
1	12	14	3	12	38	6	15	48	10	28	8	18	35	8
1	13	12	3	13	32	6	16	38	10	29	7	18	36	7
1	14	10	3	14	27	6	17	32	12	19	60	20	24	62
1	15	8	3	15	22	6	18	27	12	20	48	20	25	52
¾	4	88	3	16	17	6	19	22	12	21	38	20	26	43
¾	5	73	3	17	14	6	20	17	12	22	32	20	27	35
¾	6	60	3	18	12	6	21	14	12	23	27	20	28	27
¾	7	48	3	19	10	6	22	12	12	24	22	20	29	24
¾	8	38	3	20	8	6	23	10	12	25	17	20	30	20
¾	9	32	3½	11	60	6	24	8	12	26	14	20	31	17
¾	10	27	3½	12	48	6	25	7	12	27	12	20	32	15
¾	11	22	3½	13	38	7	15	60	12	28	10	20	33	13
¾	12	17	3½	14	32	7	16	48	12	29	8	20	34	12
¾	13	14	3½	15	27	7	17	38	12	30	7	20	35	10
¾	14	12	3½	16	22	7	18	32	14	20	60	20	36	8
¾	15	10	3½	17	17	7	19	27	14	21	48	22	25	65
¾	16	8	3½	18	14	7	20	22	14	22	38	22	26	55
⅝	5	88	3½	19	12	7	21	17	14	23	32	22	27	46
⅝	6	73	3½	20	10	7	22	14	14	24	27	22	28	38
⅝	7	60	3½	21	8	7	23	12	14	25	22	22	29	30
⅝	8	48	4	11	73	7	24	10	14	26	17	22	30	26
⅝	9	38	4	12	60	7	25	8	14	27	15	22	31	22
⅝	10	32	4	13	48	7	26	7	14	28	13	22	32	19
⅝	11	27	4	14	38	8	16	60	14	29	12	22	33	17
⅝	12	22	4	15	32	8	17	48	14	30	11	22	34	15
⅝	13	17	4	16	27	8	18	38	14	31	10	22	35	13
⅝	14	14	4	17	22	8	19	32	14	32	9	22	36	12
⅝	15	12	4	18	17	8	20	27	14	33	8	24	26	65
⅝	16	10	4	19	14	8	21	22	14	34	7	24	27	55
⅝	17	8	4	20	12	8	22	17	16	22	60	24	28	46
2	6	88	4	21	10	8	23	14	16	22–23	48	24	29	38
2	7	73	4	22	8	8	24	12	16	23	38	24	30	30
2	8	60	4½	12	73	8	25	10	16	24	32	24	31	26
2	9	48	4½	13	57	8	26	8	16	25	27	24	32	22
2	10	38	4½	14	45	8	27	7	16	26	22	24	33	19
2	11	32	4½	15	35	9	17	60	16	27	17	24	34	17
2	12	27	4½	16	29	9	18	48	16	28	15	24	35	15
2	13	22	4½	17	24	9	19	38	16	29	13	24	36	13
2	14	17	4½	18	19	9	20	32	16	30	12	26	27	65
2	15	14	4½	19	15	9	21	27	16	31	11	26	28	55
2	16	12	4½	20	13	9	22	22	16	32	10	26	29	46
2	17	10	4½	21	11	9	23	17	16	33	9	26	30	38
2	18	8	4½	22	9	9	24	14	16	34	8	26	31	30
2½	8	73	4½	23	7	9	25	12	16	35	7	26	32	26
2½	9	60	5	13	60	9	26	10	18	23	60	26	33	23
2½	10	48	5	14	48	9	27	8	18	23–24	48	26	34	19
2½	11	38	5	15	38	9	28	7	18	24	38	26	35	17
2½	12	32	5	16	32	10	18	60	18	25	32	26	36	15

WIRE CLOTH—Continued.

STEEL.

Mesh Number.	Wire Number.	Price per Square Foot.	Mesh Number.	Wire Number.	Price per Square Foot.	Mesh Number.	Wire Number.	Price per Square Foot.	Mesh Number.	Wire Number.	Price per Square Foot.	Mesh Number.	Wire Number.	Price per Square Foot.
28	28	$ 65	30	31	$ 37	35	36	$ 27	45	37	$ 42	60	38	$ 60
28	29	55	30	32	31	40	31	68	50	34	72	60	39	58
28	30	46	30	33	27	40	32	57	50	35	59	64	37	75
28	31	35	30	34	23	40	33	48	50	36	52	64	38	70
28	32	30	30	35	20	40	34	44	50	37	48	64	39	65
28	33	26	30	36	19	40	35	40	50	38	44	70	38	80
28	34	23	35	30	67	40	36	36	55	35	67	70	39	75
28	35	19	35	31	57	40	37	32	55	36	61	74	39	90
28	36	17	35	32	47	45	33	70	55	37	56	74	40	85
30	28	66	35	33	40	45	34	53	55	38	52	80	40	1 05
30	29	56	35	34	36	45	35	48	60	36	68	80	41	90
30	30	47	35	35	30	45	36	46	60	37	64	90	42	1 25

BRASS AND COPPER.

NO LENGTH LESS THAN 100 FEET SHALL BE UNDERSTOOD TO BE A ROLL.

The mesh in Wire Cloth is the distance from the center to the center of the wire per lineal inch.

LIST.

Mesh Number.	Wire Number.	Price per Square Foot.	Mesh Number.	Wire Number.	Price per Square Foot.	Mesh Number	Wire Number.	Price per Square Foot.	Mesh Number.	Wire Number.	Price per Square Foot.	Mesh Number.	Wire Number.	Price per Square Foot.
2	8	$3 50	5	18	$ 60	12	23	$ 60	20	28	$ 50	26	36	$ 27
2	9	3 00	5	19	50	12	24	50	20	29	45	30	28	1 15
2	10	2 50	5	20	45	12	25	45	20	30	40	30	29	85
2	11	2 00	5	21	40	12	26	40	20	31	35	30	30	65
2	12	1 50	5	22	35	12	27	35	20	32	30	30	31	52
2	13	1 10	6	14	2 50	14	20	2 00	20	33	27	30	32	47
2	14	80	6	15	2 00	14	21	1 50	20	34	25	30	33	42
2	15	60	6	16	1 50	14	22	1 10	22	25	1 50	30	34	37
2	16	50	6	17	1 10	14	23	80	22	26	1 10	30	35	33
2	17	45	6	18	80	14	24	60	22	27	80	30	36	30
2	18	40	6	19	60	14	25	50	22	28	60	35	30	85
3	10	3 00	6	20	50	14	26	45	22	29	50	35	31	70
3	11	2 50	6	21	45	14	27	40	22	30	45	35	32	55
3	12	2 00	6	22	40	14	28	35	22	31	40	35	33	48
3	13	1 50	6	23	35	14	29	30	22	32	35	35	34	45
3	14	1 10	8	16	2 50	16	22	1 50	22	33	30	35	35	42
3	15	80	8	17	2 00	16	23	1 10	22	34	27	35	36	37
3	16	60	8	18	1 50	16	24	80	22	35	25	40	31	90
3	17	50	8	19	1 10	16	25	60	24	26	1 50	40	32	70
3	18	45	8	20	80	16	26	50	24	27	1 10	40	33	55
3	19	40	8	21	60	16	27	45	24	28	80	40	34	48
3	20	35	8	22	50	16	28	40	24	29	60	40	35	45
4	11	3 00	8	23	45	16	29	35	24	30	50	40	36	42
4	12	2 50	8	24	40	16	30	30	24	31	45	45	33	75
4	13	2 00	8	25	35	18	23	1 50	24	32	40	45	34	58
4	14	1 50	10	18	2 00	18	24	1 10	24	33	35	45	35	50
4	15	1 10	10	19	1 50	18	25	80	24	34	30	45	36	47
4	16	80	10	20	1 10	18	26	60	24	35	27	50	34	75
4	17	60	10	21	80	18	27	50	24	36	25	50	35	58
4	18	50	10	22	60	18	28	45	26	27	1 50	50	36	50
4	19	45	10	23	50	18	29	40	26	28	1 10	60	35	78
4	20	40	10	24	45	18	30	35	26	29	80	60	36	60
4	21	35	10	25	40	18	31	30	26	30	60	60	37	52
5	13	2 50	10	26	35	18	32	27	26	31	50	70	37	70
5	14	2 00	12	19	2 00	20	24	1 50	26	32	45	80	38	90
5	15	1 50	12	20	1 50	20	25	1 10	26	33	40	90	39	1 10
5	16	1 10	12	21	1 10	20	26	80	26	34	35	100	40	1 30
5	17	80	12	22	80	20	27	60	26	35	30	...	..	....

CANTON STEEL.

CANTON EXTRA DRILL STEEL.
CANTON EXTRA GROOVE STEEL.
CANTON TOOL STEEL.

CANTON PICK STEEL,
SUPERIOR FOR TOUGHNESS AND EASE OF WELDING.

BEST REFINED TOOL STEEL.

ROUND, SQUARE AND OCTAGON.

⅝ to 2 inch, Base ..... Cents per pound.

	Extra per Pound. Cents.
2⅛ to 3 inch	1
3⅛ to 4 inch	1.5
4⅛ to 5 inch	2
5⅛ to 6 inch	2.5
6⅛ to 7 inch	3
7⅛ to 8 inch	3.5

	Extra per Pound. Cents.
9/16 to ½ inch	0.5
7/16 to ⅜ inch	1
5/16 and 11/32 inch	2
¼ and 9/32 inch	3
3/16 inch	5
⅛ inch	18

FLAT TOOL STEEL.

	Extra per Pound. Cents.
⅛ x 7/16 to ½ inch	3
⅛ x 9/16 to 7 inch	2
⅛ x 7⅛ to 8 inch	3
3/16 x ¼ inch	5
3/16 x 5/16 inch	4
3/16 x ⅜ inch	3
3/16 x 7/16 to ⅝ inch	2
3/16 x 11/16 to 2 inch	1 5
3/16 x 2⅛ to 7 inch	1
3/16 x 7⅛ to 8 inch	2
¼ x 5/16 to ⅜ inch	2
¼ x 7/16 to ⅝ inch	1.5
¼ x 11/16 to 2 inch	1.5
¼ x 2⅛ to 7 inch	1
¼ x 7⅛ to 8 inch	2
5/16 x ⅜ to ⅝ inch	1.5
5/16 x 11/16 to 8 inch	1

	Extra per Pound. Cents.
⅜ x 7/16 to 8 inch	0.1
7/16 x ½ to 8 inch	0.1
½ x 9/16 to 8 inch	0.1
9/16 x 2⅛ to 8 inch	1
9/16 to 2 x ⅝ to 2 inch, Base	...
⅝ to 2 x 2⅛ to 7 inch	1
⅝ to 1¾ x 7⅛ to 8 inch	1
1⅞ to 2 x 7⅛ to 8 inch	1.5
2⅛ to 3 x 2⅛ to 5 inch	1
2⅛ to 3 x 5⅛ to 8 inch	1.5
3⅛ to 4 x 3⅛ to 6 inch	1.5
3⅛ to 4 x 6⅛ to 8 inch	2
4⅛ to 5 x 4⅛ to 7 inch	2
4⅛ to 5 x 7⅛ to 8 inch	2.5
5⅛ to 6 x 5⅛ to 8 inch	2.5
6⅛ to 7 x 6⅛ to 7 inch	3
6⅛ to 8 x 7⅛ to 8 inch	3.5

Cutting to multiples or specified lengths, over 24 inches long, ½ cent per pound extra; shorter lengths, according to contract.

CANTON SPECIAL TOOL STEEL.

⅝ to 2 inch, Base ..... Cents per pound.

OPEN HEARTH SPRING STEEL.

Open Hearth Spring Steel, Base ..... Cents per pound.
1¼ to 4 inch by Number 4 gauge to ½ inch inclusive ..... Base.
1 and 1⅛ inch by Number 1 gauge to 4 gauge inclusive ..... 0.2c extra.
1 to 3 inch by Number 5 gauge to 7 gauge inclusive ..... 0.5c extra.

Cutting to length, 24 inch and over, 1/10 cent per pound extra.

STEEL—Continued.

MACHINERY STEEL.

Round Ordinary Finish.

	Cents per pound.
1 to 3 inches, advancing by $\frac{1}{16}$ inch, Base	
$3\frac{1}{4}$ to 4 inches, advancing by $\frac{1}{4}$ inch	0 3 extra.
$4\frac{1}{4}$ to 5 inches, advancing by $\frac{1}{4}$ inch	1.0 extra.
$\frac{3}{4}$ to $1\frac{3}{16}$ inches, advancing by $\frac{1}{16}$ inch	0.2 extra.
$1\frac{1}{4}$ to $1\frac{1}{16}$ inches, advancing by $\frac{1}{16}$ inch	0.3 extra.
$\frac{3}{8}$ and $\frac{7}{16}$ inch	0.4 extra.
$\frac{5}{16}$ inch	0.5 extra.
$\frac{1}{4}$ inch	0 7 extra.
Machine Cutting, specified lengths, above 24 inches	0.2
Machine Cutting, specified lengths, 12 to 24 inches	0.4

Machine Cutting, specified lengths, less than 12 inches, according to contract, but not less than 0.6c on each size extra.

CAST SPRING STEEL.

FOR LOCOMOTIVE SPRINGS, ETC.

	Cents per pound.
Cast Spring Steel, Base	
$1\frac{1}{4}$ to 4 inches x Number 4 gauge to $\frac{1}{2}$ inch inclusive	Base.
1 and $1\frac{1}{8}$ inches x Number 1 gauge to 4 gauge inclusive	0.2 extra.
1 to 3 inches x Number 5 gauge to 7 gauge inclusive	0.5 extra.
$\frac{3}{4}$ to 3 inches x Number 8 gauge to 10 gauge inclusive	1.0 extra.
$\frac{3}{4}$ to 3 inches x Number 11 gauge to 16 gauge inclusive	2 0 extra.

Cutting to length, 24 inches and over, $\frac{1}{4}$c per pound extra; and under, according to special contract.

ROUND CAST SPRING STEEL.

	Cents per pound.
$\frac{5}{8}$ to $1\frac{1}{2}$ inches, Base	
$\frac{1}{2}$ to $\frac{9}{16}$ inch	0 2 extra.
$\frac{3}{8}$ to $\frac{7}{16}$ inch	0.5 extra.
$\frac{5}{16}$	1.0 extra.
$\frac{1}{4}$	1.5 extra.

MISCELLANEOUS CAST STEEL.

Pick Steel, tool quality	cents per pound.
Pick and Mattock, cast quality	cents per pound.
Pike and Cant Hook	cents per pound.
Granite and Coal Wedge	cents per pound.
Lay Steel, hammered	cents per pound.
Horse Rasp	cents per pound.

CORRUGATED STEEL SHEETS.

Our Corrugated Sheets are painted on both sides with the best of iron ore paint, ground in pure linseed oil. Approximate Weights of $2\frac{1}{2}$-inch Corrugated Sheets per square of 100 square feet. No allowance for laps.

PAINTED RED.

LIST.

Gauge Numbers	28	27	26	24	22	20	18	16
Approximate weight per square ....Pounds,	69	77	84	111	138	165	220	275

For white painted sheets add 25c per square. For graphite painted sheets add 15c per square.

GALVANIZED.

Gauge Numbers	28	27	26	24	22	20	18	16
Approximate weight per square ....Pounds,	86	93	99	127	154	182	236	291

NOTE.—Three-sixteenths inch Corrugations same list prices. For price on $1\frac{1}{4}$ and $\frac{5}{8}$-inch Corrugations, same gauges as above, add 5 per cent.

PRICES ON APPLICATION.

GALVANIZED STEEL SHEETS.

Table showing gauges, price per pound, and cost per 100 square feet at list.

Gauge Numbers	10	12	14	16	18	19	20	21	22	23	24	25	26	27	28	29	30
Price..Per 100 sq. ft.,	$6 97	5 47	3 97	3 22	2 84	2 52	2 19	2 03	2 01	1 84	1 66	1 59	1 41	1 40	1 38	1 42	1 44

Cost per 100 pounds, different gauges, at discounts ranging from 67½ to 77½ and 10 per cent.

Gauge.	Price Per Pound. Cents.	67½	67½ and 5	67½ and 10	70	70 and 5	70 and 10	72½	72½ and 5	72½ and 10	75	75 and 5	75 and 10	77½	77½ and 5	77½ and 10
10–16	12	3.900	3.705	3.510	3 60	3.420	3.24	3.300	3.135	2.970	3 00	2.850	2.700	2.700	2.565	2.430
18–21	13	4.225	4.014	3.802	3.90	3.705	3.51	3.575	3.396	3.217	3 25	3.087	2.925	2.925	2.779	2.632
22–24	14	4.550	4.322	4.095	4.20	3 990	3.78	3.850	3.657	3.465	3.50	3.325	3.150	3.150	2.992	2.835
25–26	15	4.875	4.631	4.387	4 50	4.275	4.05	4.125	3.919	3.712	3.75	3.562	3.375	3.375	3.206	3.037
27	16	5 200	4.940	4.680	4 80	4.560	4.32	4.400	4.180	3.960	4.00	3.800	3.600	3.600	3.420	3.240
28	17	5 525	5.249	4.972	5.10	4.845	4.59	4.675	4.441	4.207	4.25	4.037	3.825	3.825	3.634	3.442
29	19	6.175	5.866	5.557	5.70	5 415	5.13	5.225	4.964	4.702	4.75	4.512	4.275	4.275	4.061	3.847
30	21	6.825	6 484	6.142	6.30	5.985	5.67	5.775	5 486	5.197	5.25	4.987	4 725	4.725	4.489	4.252

STANDARD SIZES.

Gauges Numbers 14 to 28 inclusive, 24, 26, 28 or 30 inches wide, and 72, 84 or 96 inches long.

ADDITIONAL PRICES ON EXTRA SIZES.

On Number 19 gauge and lighter as follows:

EXTRA WIDTHS.

Less than 24 inches wide ..... 1c per Pound.
Over 32 inches to 36 inches wide inclusive ..... 1c per Pound.
Over 36 inches to 40 inches wide inclusive ..... 2c per Pound.
Over 40 inches to 44 inches wide inclusive ..... 3c per Pound.

On Numbers 16, 17 and 18 gauges:

Over 36 inches to 40 inches ..... 1c per Pound.
Over 40 inches to 44 inches ..... 1½c per Pound.
Over 44 inches to 48 inches ..... 2½c per Pound.

EXTRA LENGTHS.

Longer than 120 inches ..... 1c per Pound.

EXTREME SIZES.

Gauges 14 to 24 ..... 48 x 126 inches.
Gauges 26 to 28 ..... 44 x 126 inches.

SHEET STEEL.

LIST.

$\frac{5}{8}$ x $\frac{3}{16}$ ..... Base.
Number 8, add to base price 5c
Number 10, add to base price 10c
Number 12, add to base price 20c
Number 14, add to base price 35c
Number 16, add to base price 50c
Number 18, add to base price 60c
Number 20, add to base price 65c
Number 22, add to base price 70c
Number 24, add to base price ....
Number 26, add to base price ....
Number 27, add to base price ....
Number 28, add to base price ....

NATIONAL BAR IRON CLASSIFICATION.

Adopted December 3, 1895.
All other cards abolished.

ROUNDS AND SQUARES.

1 to 1⅞, Base	Cents per pound.
2 to 2⅞	.2 extra.
3 to 3½	.5 extra.
3⅝ to 4	.8 extra.
4⅛ to 4½	1. extra.
4⅝ to 5	1.3 extra.
5⅛ to 6	1.8 extra.
6⅛ to 6½	2.2 extra.
6⅝ to 7¼	2.5 extra.
¾ to ⅞	.1 extra.
⅝ to 11/16	.2 extra.
½ to 9/16	.3 extra.
7/16 to 15/32	.4 extra.
⅜ to 13/32	.5 extra.
5/16 to 11/32	.7 extra.
¼ to 9/32	.9 extra.
7/32	1.4 extra.
3/16	2.5 extra.

FLATS.

1½ to 4 x ⅜ to 1 Base	Cents per pound.
4¼ to 6 x ⅜ to 1	.1 extra.
4¼ to 6 x 1 1/16 to 1½	.4 extra.
6¼ to 8 x ⅜ to 1	.6 extra.
6¼ to 8 x 1 1/16 to 1½	.6 extra.
8¼ to 10 x ⅜ to 1	.8 extra.
1⅜ to 4 x 1⅛ to 1½	.3 extra.
2 to 4 x 1⅝ to 2	.5 extra.
4¼ to 6 x 1⅝ to 2	.6 extra.
6¼ to 8 x 1⅝ to 2	.8 extra.
8¼ to 10 x 1 1/16 to 1½	.9 extra.
8¼ to 10 x 1⅝ to 2	1. extra.
2 to 4 x 2⅛ to 3	.6 extra.
4¼ to 6 x 2⅛ to 3	.8 extra.
6¼ to 8 x 2⅛ to 3	1. extra.
1⅛ to 1⅜ x ⅜ to 1	.1 extra.
1 to 1 1/16 x ⅜ to ⅞	.2 extra.
¾ to 15/16 x ⅜ to ¾	.4 extra.
⅝ to 11/16 x ⅜ to ⅝	.5 extra.
½ to 9/16 x ⅜ to ½	.9 extra.

BEVEL EDGE BOX IRON.

Same as light bands, of same sizes.
Beaded Band Iron, 1¼ inches to 2 inches, 7/10c. Sand Band Iron, 1/10c above same sizes of Light Bands.

OVAL IRON.

⅞ to 1½	.4 extra.
¾ to 13/16	.5 extra.
⅝ to 11/16	.6 extra.
½ to 9/16	8 extra.
⅜ to 7/16	1.1 extra.
½ to 9/16 x 3/16	1. extra.
⅝ to 11/16 x ⅛	1.2 extra.

NATIONAL BAR IRON CLASSIFICATION—Continued.

HEAVY BANDS.

8¼ to 10 x ¼ to 5/16	.7 extra.
7 to 8 x ¼ to 5/16	.7 extra.
6¼ to 6¾ x ¼ to 5/16	.5 extra.
4¼ to 6 x ¼ to 5/16	.3 extra.
1½ to 4 x ¼ to 5/16	.2 extra.
1 to 1⅜ x ¼ to 5/16	.3 extra.
¾ to 15/16 x ¼ to 5/16	.5 extra.
⅝ to 11/16 x ¼ to 5/16	.8 extra.
½ to 9/16 x ¼ to 5/16	1. extra.
⅜ to 7/16 x ¼ to 5/16	1.5 extra.

Heavy bands, 7/32-inch thick 1/10c per pound higher than ¼ to 5/16 thick. Bevel edge shaft iron 1/10 higher than same size of heavy bands.

LIGHT BANDS.

7 to 8 x Number 9 to 3/16	.9 extra.
7 to 8 x Numbers 10, 11 and 12	1 extra.
6¼ to 6¾ x Number 9 to 3/16	.7 extra.
6¼ to 6¾ x Numbers 10, 11 and 12	.8 extra.
4¼ to 6 x Number 9 to 3/16	.5 extra.
4¼ to 6 x Numbers 10, 11 and 12	.6 extra.
1¼ to 4 x Number 9 to 3/16	.4 extra.
1¼ to 4 x Numbers 10, 11 and 12	.5 extra.
1 to 1 3/16 x Number 9 to 3/16	.5 extra.
1 to 1 3/16 x Numbers 10, 11 and 12	.6 extra.
13/16 to ⅞ x Number 9 to 3/16	.6 extra.
13/16 to ⅞ x Numbers 10, 11 and 12	.7 extra.
11/16 to ¾ x Number 9 to 3/16	.8 extra.
11/16 to ¾ x Numbers 10, 11 and 12	.9 extra.
9/16 to ⅝ x Number 9 to 3/16	1 extra.
9/16 to ⅝ x Numbers 10, 11 and 12	1.1 extra.
7/16 to ½ x Number 9 to 3/16	1.3 extra.
7/16 to ½ x Numbers 10, 11 and 12	1.4 extra.
⅜ x Number 9 to 3/16	1.5 extra.
⅜ x Numbers 10, 11 and 12	1.6 extra.

HALF OVAL AND HALF ROUND.

2¼ to 3	.6 extra.
⅞ to 2	.5 extra.
¾ to 13/16	.7 extra.
⅝ to 11/16	.9 extra.
½ to 9/16	1.2 extra.
⅜ to 7/16	2.5 extra.
5/16	3.5 extra.
¼	4.5 extra.

Half oval, less than ¼ their width in thickness, extra price.

HORSE SHOE IRON.

All sizes ..... 1c extra.

Cutting ordinary bars to specified length, 2/10 to 3/10 extra, according to length and size.

SHEET AND BAR COPPER.

LIST.

SIZE OF SHEETS.		64 Ounces and Over. 50-Pound Sheet, 30x60 and Heavier. Cents per Pound.	32 Ounces to 64 Ounces 25 to 50-Pound Sheet, 30x60. Cents per Pound.	24 Ounces to 32 Ounces 18¾ to 25-Pound Sheet, 30x60. Cents per Pound.	16 Ounces to 24 Ounces 12½ to 18¾-Pound Sheet, 30x60. Cents per Pound.	14 Ounces & 15 Ounces 11 to 12½-Pound Sheet, 30x60. Cents per Pound.	12 Ounces & 13 Ounces. 9½ to 11-Pound Sheet, 30x60. Cents per Pound.	10 Ounces & 11 Ounces. 7½ to 9¾-Pound Sheet, 30x60. Cents per Pound.	8 Ounces and 9 Ounces 6¼ to 7½-Pound Sheet, 30x60. Cents per Pound.	Lighter than 8 Ounces Cents per Pound.
Widths.	Lengths.									
Not wider than 30 inches.	Not longer than 72 inches...	26	26	26	26	27	28	29	32	35
	Longer than 72 inches..... Not longer than 96 inches.	26	26	26	26	27	29	32	35	..
	Longer than 96 inches.....	26	26	26	26	28	32	..	..	..
Wider than 30 inches but not wider than 36 inches.	Not longer than 72 inches...	26	26	26	26	28	30	33	36	..
	Longer than 72 inches..... Not longer than 96 inches.	26	26	26	26	28	32	35	..	..
	Longer than 96 inches..... Not longer than 120 inches	26	26	26	27	29	..	..	..	..
	Longer than 120 inches.....	26	26	27	28	..	..	..	..	..
Wider than 36 inches but not wider than 48 inches.	Not longer than 72 inches...	26	26	27	28	30	33	36	..	..
	Longer than 72 inches..... Not longer than 96 inches.	26	26	27	29	31	34	..	..	..
	Longer than 96 inches. .. Not longer than 120 inches	26	26	28	30	34	..	..	..	..
	Longer than 120 inches.....	26	27	29	32	..	..	..	..	..
Wider than 48 inches but not wider than 60 inches.	Not longer than 72 inches...	26	26	27	29	32	37	..	..	..
	Longer than 72 inches..... Not longer than 96 inches.	26	26	28	30	35	..	..	..	..
	Longer than 96 inches..... Not longer than 120 inches	26	27	29	32	..	..	..	..	..
	Longer than 120 inches.....	26	28	30	34	..	..	..	..	..
Wider than 60 in. but not wider than 72 inches.	Not longer than 96 inches...	26	27	29	34	..	..	..	..	..
	Longer than 96 inches..... Not longer than 144 inches	26	28	31	36	..	..	..	..	..
	Longer than 144 inches.....	27	29	34	..	..	..	..	..	..
Wider than 72 inches not wider than 108 inches.	Not longer than 120 inches..	27	29	35	..	..	..	..	..	..
	Longer than 120 inches.....	29	30	..	..	..	..	..	..	..
Wider than 108 inches.	Not longer than 144 inches.	30	32	..	..	..	..	..	..	..
	Longer than 144 inches.....	31	34	..	..	..	..	..	..	..

BOLT COPPER, ⅜ inch diameter and over, per pound, 32 cents.

CIRCLES, SEGMENTS and PATTERN SHEETS, 3 cents per pound advance over prices of Sheet Copper required to cut them from.

COLD or HARD ROLLED COPPER, 14 ounces per square foot and heavier, 1 cent per pound over the foregoing prices.

COLD or HARD ROLLED COPPER, lighter than 14 ounces per square foot, 2 cents per pound over the foregoing prices.

TINNING.

Tinning Sheets, on one side, 10, 12 and 14x48	Each,	$0 12
Tinning Sheets, on one side, 30x60	Each,	50
For Tinning Boiler Sizes, 9 inches (sheets, 14x60 inches)	Each,	24
For Tinning Boiler Sizes, 8 inches (sheets, 14x56 inches)	Each,	20
For Tinning Boiler Sizes, 7 inches (sheets, 14x52 inches)	Each,	16
Tinning Sheets, on one side, other sizes	Per square foot,	04

For Tinning both sides, double the above prices.

TEE RAIL.

We carry in stock Mine Rail of various weights, Spikes, Splices, Bolts, Etc.

Pounds to the Yard	8	12	16	20	25	30	40
Price.....Per pound	....	....	....	....	....	....	....

For Mine Track, 8-pound rail is generally used.

Weight of material in 100 feet of track:

Rail, 530 pounds; Spikes, 40 pounds; Splices, 30 pounds; Bolts, 30 pounds.

The Rails are made in about 15-foot lengths.

PRICES ON APPLICATION.

TRACK SPIKES.

LIST.

Sizes	$\frac{5}{16}$ x 2½	⅜ x 2½	⅜ x 3	⅜ x 3½	½ x 4	½ x 4½
Price.....Per pound, $.....						

SPLICE JOINTS.

For any size Rail .....Per pound, $.....

OVAL NECK TRACK BOLTS.

SQUARE NUTS.

Rails Used.	Bolts.	Number Keg 200 Pounds.	Kegs Per Mile.	Rails Used.	Bolts.	Number Keg 200 Pounds.	Kegs Per Mile.
20 to 30	½ x 3	665	2.2	8 to 16	⅜ x 2	1560	1
20 to 30	½ x 2½	715	2	8 to 16	⅜ x 1¾	1680	1
20 to 30	½ x 2¼	750	2	8 to 16	⅜ x 1½	1800	1
20 to 30	½ x 2	775	2	8 to 16	⅜ x 1¼	1975	1

Other sizes furnished to order.

CUT AND WIRE NAILS.

Adopted July 22, 1895.

Base Price.....Per keg, $.....

To base price add following extras.

LIST.

Common, Fence, Shingle, Flooring and Common Brads.	Smooth Finishing.	Smooth Casing.	Fine Nails.	Barbed Roofing.
60d.....$ 50	20d.....$ 75	30d and 40d..$ 65	2d $1 90	¾ inch....$2 00
50d.....50	12d and 16d...75	20d 65	3d 1 60	⅞ inch....1 75
30d and 40d....50	10d.....75	12d and 16d..65	4d 1 25	1 inch....1 50
20d.....50	8d and 9d....90	10d 65	.....	1¼ inch....1 25
12d and 16d....50	6d and 7d....1 10	8d and 9d...75	.....	1⅛ inch....1 10
10d.....50	5d.....1 25	6d and 7d...90	.....	1¾ inch....1 05
8d and 9d.....60	4d.....1 45	5d 1 10	.....	2 inch....90
6d and 7d.....75	3d.....1 65	4d 1 25	.....	.....
4d and 5d.....90	2d.....1 90	3d 1 50	.....	.....
3d.....1 20	Barbed Finishing, 25 cents advance.	2d 1 75	.....	.....
2d.....1 60		.....	.....	.....

BRASS SPRING WIRE.

Price ..... Per pound, $0 50

COPPER WIRE.

Price ..... Per pound, $0 50

SHEET BRASS.

Price ..... Per pound, $0 60

ANNEALED WIRE.

LIST.

Numbers	6	7	8	9	10	11	12	14	16
Price ..... Per pound,	$0 10	0 10	0 10	0 10	0 11	0 11	0 11½	0 12½	0 14

Numbers	17	18	19	20	22	24	25	26
Price ..... Per pound,	$0 15	0 16	0 19	0 20	0 22	0 24	0 25	0 26

SASH WEIGHTS.

Price ..... Per pound, $0 05

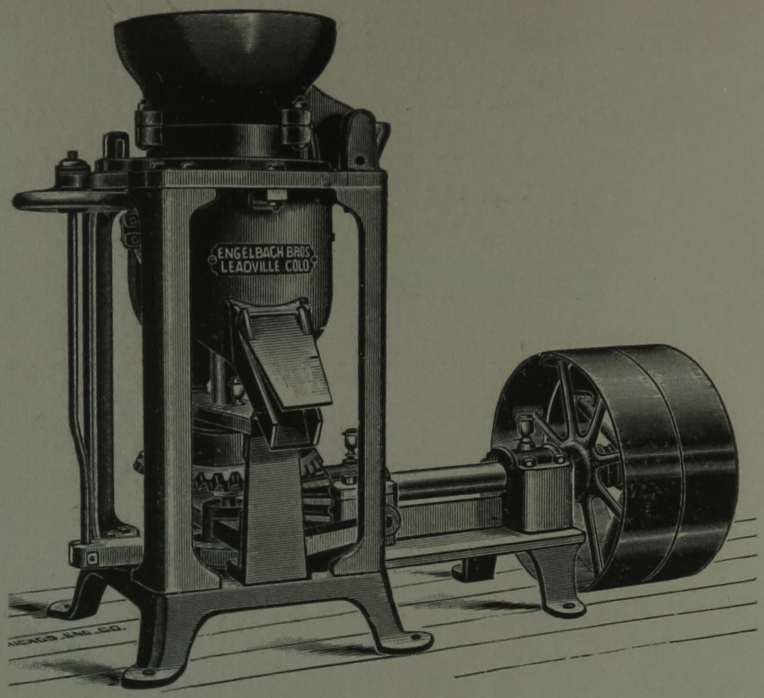
CUTTING THREADS ON WROUGHT-IRON PIPE.

LIST.

Size ..... Inches,	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½
Price	$0 05	0 05	0 05	0 05	0 05	0 06	0 07	0 08	0 10	0 15

Size ..... Inches,	3	3½	4	4½	5	6	7	8	9	10	12
Price	$0 20	0 25	0 35	0 45	0 55	0 70	0 85	1 00	1 25	1 50	2 50

Cuts one-half price of threads.



IMPROVED ORE-SAMPLE GRINDER.

FOR SMELTERS, MILLS AND SAMPLING WORKS.

This machine is designed for the purpose of simplifying and economizing the grinding of ore samples. The mill is simple in construction, compact and extremely durable, and is extensively used by the leading smelters and sampling works. The hopper and grinding ring may be swung open and the cone lifted out and cleaned after the sample has been ground. The grinding ring and hopper are attached and connected by bolts, so that when the grinding ring or cone are worn, they may be replaced by new ones without difficulty. The grinding parts are made of a hard composition metal, and are very durable. They are about 12 inches in diameter. The spout is cast, making it seamless, leaving no cracks or crevices in which the ore is liable to lodge, and is divided in the center, thus giving double issue. The machine has tight and loose pulleys, the driving pulley being 18 inches in diameter by 6 inch face, and the loose pulley 16 inches in diameter, which relieves the belt when shifted. The speed of the shaft which carries the pulleys is about 100 revolutions per minute. The floor space occupied by this mill is about 2½ x 5 feet. Shipping weight, 850 pounds.

Mill, complete.....$.....

Extra Cone and Ring.....

PRICES ON APPLICATION.

MILL SCREENS.

Perforated Steel, any Mesh to order. Gilpin County Screens.

PRICES ON APPLICATION.

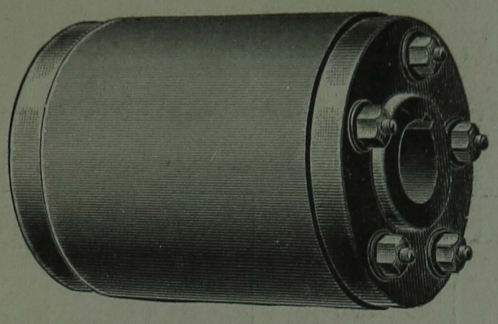
HAND WINDLASS.

Irons only.....$.....

PRICES ON APPLICATION.

SCREEN BARS.

Price.....Per pound, $ 0 06



PAPER FRICTION GEARING.

BORED, TURNED, KEY-SEATED, AND FILLED WITH TRUNK BOARD PAPER, AND HAS CAST SLEEVE RUNNING FULL LENGTH.

Friction Gearing is noiseless in operation. May be made to transmit any power required, from the lightest to the heaviest load, and when properly adjusted there is virtually no wear on them. Paper and iron frictions are being extensively used for hoisting and various other purposes.

LIST.

Diameter. Inches.	Face. Inches.	Price.	Diameter. Inches.	Face. Inches	Price.	Diameter. Inches.	Face. Inches.	Price.	Diameter. Inches.	Face. Inches.	Price.	Diameter. Inches.	Face. Inches.	Price.
6	3	$11 00	10	10	$20 00	14	16	$46 00	20	6	$32 00	30	8	$61 00
6	4	11 75	10	12	23 00	16	6	24 00	20	8	39 00	30	10	71 00
6	5	12 50	10	14	26 00	16	8	29 00	20	10	46 00	30	12	81 00
6	6	13 25	10	16	29 00	16	10	34 00	20	12	53 00	30	14	91 00
6	7	14 00	12	4	14 50	16	12	39 00	20	14	61 00	30	16	101 00
6	8	15 25	12	5	16 00	16	14	45 00	20	16	69 00	30	18	111 00
6	10	17 00	12	6	17 50	16	16	51 00	20	18	77 00	30	20	121 00
8	4	12 50	12	8	21 00	16	18	59 00	20	20	87 00	30	24	141 00
8	5	13 25	12	10	25 00	16	20	67 00	20	24	102 00	30	30	172 00
8	6	14 00	12	12	29 00	18	6	27 00	24	8	47 00	30	36	203 00
8	8	16 00	12	14	34 00	18	8	33 00	24	10	56 00	36	10	87 00
8	10	18 00	12	16	40 00	18	10	39 00	24	12	65 00	36	12	101 00
8	12	20 00	14	4	17 00	18	12	45 00	24	14	74 00	36	14	115 00
10	4	13 00	14	6	21 00	18	14	52 00	24	16	83 00	36	16	129 00
10	5	14 00	14	8	25 00	18	16	59 00	24	18	92 00	36	18	143 00
10	6	15 00	14	10	29 00	18	18	67 00	24	20	102 00	36	20	157 00
10	7	16 00	14	12	34 00	18	20	77 00	24	24	112 00	36	24	187 00
10	8	17 00	14	14	39 00	18	24	91 00	24	30	142 00	36	30	232 00

HILL'S FRICTION CLUTCHES AND CLUTCH PARTS.

LIST.

Clutch Mechanisms.				Spiders. Price.	B. & C. Jaws. Complete. Price Per Pair.	Clutch Mechanisms.				Spiders. Price.	B. & C. Jaws. Complete. Price Per Pair.
Size Clutch.	Number Arms.	Largest Bore.	Price.			Size Clutch.	Number Arms.	Largest Bore.	Price.		
18	2		$ 28 00	$ 14 00	$ 2 25	36	4		$ 96 00	$ 39 00	$ 6 25
	4	4	36 00	17 50			6	8	126 00	50 00	
20	2		32 00	15 50	2 75	40	4		132 00	50 00	8 00
	4	4½	45 00	19 00			6	8½	156 00	70 00	
22	2		36 00	16 50	3 25	48	4		180 00	73 50	10 50
	4	5	54 00	21 00			6	9	216 00	98 50	
24	2		44 00	19 00	4 00	54	4		240 00	92 00	14 00
	4	5½	63 00	23 50			6	10	276 00	122 00	
28	2		52 00	22 00	4 50	60	6	12	520 00	186 00	21 75
	4	6	72 00	28 00		72	6	12	1032 00	562 00	32 50
32	2		60 00	26 00	5 25	84	6	12	1600 00	820 00	46 00
	4	7	81 00	33 00		..	.	..	.....	.....	.....

SPIRAL SEAM RIVETED PIPE.

No. 12 BIRMINGHAM WIRE GAUGE. THICKNESS, .109 INCH.

LIST.

Diameter. Inches.	Approximate Weight per 100 Feet. Pounds.	Approx. Bursting Pressure per Square Inch. Pounds.	Black.	Dipped in Coal Tar and Asphalt.	Galvanized.
9	1180	880	$1 70	$1 79	$2 50
10	1300	800	1 90	2 00	2 75
11	1425	725	2 25	2 36	3 00
12	1700	660	2 50	2 62	3 25
13	1810	615	2 70	2 83	3 50
14	2010	570	2 90	3 04	3 75
15	2165	530	3 10	3 25	4 00
16	2310	500	3 25	3 41	4 25
18	2570	440	3 60	3 78	4 70
20	2830	400	4 00	4 20	5 25
22	3090	365	4 35	4 57	5 75
24	3380	335	4 70	4 94	6 25

No. 14. THICKNESS, .083 INCH.

LIST.

Diameter. Inches.	Approximate Weight per 100 Feet. Pounds.	Approx. Bursting Pressure per Square Inch. Pounds.	Black.	Dipped in Coal Tar and Asphalt.	Galvanized.
6	610	1100	$ 89	$ 95	$1 15
7	700	950	1 02	1 09	1 35
8	825	825	1 15	1 23	1 50
9	925	750	1 32	1 41	1 70
10	1025	650	1 40	1 50	1 80
11	1125	600	1 50	1 61	1 95
12	1325	550	1 80	1 92	2 35
13	1425	500	1 90	2 03	2 50
14	1560	470	2 10	2 24	2 70
15	1680	450	2 25	2 40	2 90
16	1790	400	2 40	2 56	3 15
18	2000	370	2 75	2 93	3 60
20	2200	325	3 10	3 30	4 00
22	2400	300	3 40	3 62	4 55
24	2620	275	3 70	3 94	4 85

No. 16. THICKNESS, .065 INCH.

LIST.

Diameter. Inches.	Approximate Weight per 100 Feet. Pounds.	Approx. Bursting Pressure per Square Inch. Pounds.	Black.	Dipped in Coal Tar and Asphalt.	Galvanized.
4	320	1250	$ 50	$ 54	$ 70
5	415	1000	60	65	85
6	500	800	70	76	1 00
7	550	700	80	87	1 10
8	650	600	93	1 01	1 28
9	750	550	1 08	1 17	1 47
10	800	500	1 15	1 25	1 55
11	850	450	1 20	1 31	1 70
12	1025	400	1 45	1 57	2 05
13	1100	380	1 55	1 68	2 15
14	1200	360	1 70	1 84	2 40
15	1300	330	1 85	2 00	2 60
16	1375	300	2 00	2 16	2 75
18	1550	280	2 20	2 38	3 10
20	1675	250	2 45	2 65	3 40
22	1825	230	2 80	3 02	3 90
24	2000	210	3 00	3 24	4 30

SPIRAL SEAM RIVETED PIPE—Continued.

No. 18. THICKNESS, .049 INCH.

LIST.

Diameter. Inches.	Approximate Weight per 100 Feet. Pounds.	Approx. Bursting Pressure per Square Inch. Pounds.	Black.	Dipped in Coal Tar and Asphalt.	Galvanized.
3	185	1300	$ 34	$ 37	$ 46
4	245	1000	42	46	58
5	300	800	50	55	70
6	360	700	57	63	85
7	400	600	63	70	90
8	460	500	73	81	1 05
9	525	450	82	91	1 18
10	575	400	90	1 00	1 30
11	625	360	95	1 06	1 40
12	750	330	1 15	1 27	1 65
13	800	300	1 25	1 38	1 80
14	900	280	1 35	1 49	1 95
15	950	260	1 50	1 65	2 10
16	1000	250	1 60	1 76	2 25
18	1125	220	1 75	1 93	2 55
20	1250	200	2 00	2 20	2 90
22	1350	180	2 20	2 42	3 10
24	1460	160	2 40	2 64	3 35

No. 20. THICKNESS, .035 INCH.

LIST.

Diameter. Inches.	Weight per 100 Feet. Pounds.	Approx. Bursting Pressure per Square Inch. Pounds.	Black.	Dipped in Coal Tar and Asphalt.	Galvanized.
3	150	900	$ 27	$ 30	$ 38
4	200	700	35	39	48
5	250	550	40	45	60
6	300	450	46	52	68
7	325	400	51	58	75
8	360	350	58	66	85
9	410	325	66	75	97
10	500	275	72	82	1 05
11	550	250	78	89	1 20
12	600	225	90	1 02	1 35
13	650	210	1 00	1 13	1 50
14	700	200	1 10	1 24	1 60
15	750	190	1 20	1 35	1 75
16	800	160	1 30	1 46	1 85
18	900	150	1 40	1 58	2 05
20	960	140	1 60	1 80	2 30
22	1040	125	1 80	2 02	2 55
24	1150	110	1 95	2 19	2 85

No. 22. THICKNESS, .028 INCH.

LIST.

Diameter. Inches.	Approximate Weight per 100 Feet. Pounds.	Black.	Dipped in Coal Tar and Asphalt.	Galvanized.
3	130	$ 24	$ 27	$ 32
4	160	30	34	43
5	200	37	42	53
6	240	40	46	60
7	260	45	52	65
8	300	53	61	75
9	340	60	69	90
10	380	65	75	1 00
11	420	70	81	1 10
12	490	82	94	1 25
13	530	90	1 03	1 35
14	575	1 00	1 14	1 45

SPIRAL SEAM RIVETED PIPE—Continued.

No. 24. THICKNESS, .022 INCH.

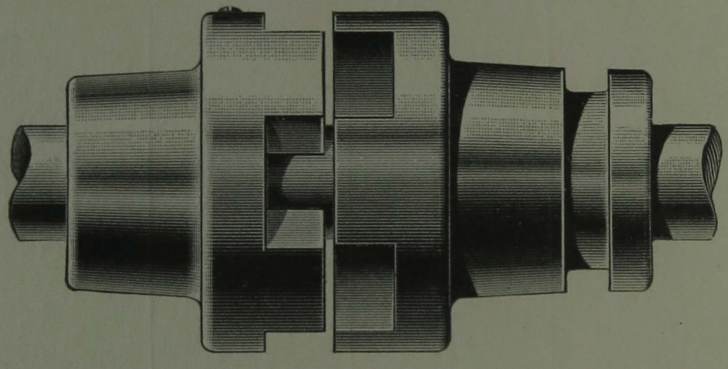
LIST.

Diameter. Inches.	Approximate Weight per 100 Feet. Pounds.	Black.	Dipped in Coal Tar and Asphalt.	Galvanized.
3	100	$0 20	$0 23	$ 30
4	130	25	29	38
5	160	30	35	45
6	185	33	39	50
7	210	37	44	60
8	240	42	50	65
9	280	48	57	75
10	300	54	64	85
11	330	60	71	90
12	400	68	80	1 05

In lengths of 10 feet and less. Each length tested to service required.

In lieu of crimped end, inside riveted sleeves can be furnished at a small additional cost.

The above approximate weights are for black pipe only, and intended as guides for estimating freight charges; galvanized or asphalted pipe, same gauge and diameter, is from 20 to 30 per cent. heavier. In ordering pipe, the margin of safety should be at least one-half or two-thirds of the bursting pressure.



DENTAL CLUTCH COUPLINGS.

LIST.

Diameter of Shaft. Inches.	Not Fitted.	Fitted on Shaft.	Lever.
$1\frac{3}{16}$	$ 6 60	$ 11 00	$ 5 00
$1\frac{7}{16}$	8 00	12 80	5 50
$1\frac{11}{16}$	9 00	14 30	6 00
$1\frac{15}{16}$	10 50	16 00	7 00
$2\frac{3}{16}$	12 75	18 60	7 50
$2\frac{7}{16}$	15 25	21 50	8 25
$2\frac{11}{16}$	18 00	24 80	9 50
$2\frac{15}{16}$	21 25	29 00	10 25
$3\frac{3}{16}$	26 00	34 75	11 00
$3\frac{7}{16}$	33 50	43 25	11 00
$3\frac{11}{16}$	40 50	51 00	11 00
$3\frac{15}{16}$	49 25	60 50	13 00
$4\frac{3}{16}$	57 00	69 00	13 00
$4\frac{7}{16}$	67 00	81 00	13 00
$4\frac{11}{16}$	73 00	87 70	13 00
$4\frac{15}{16}$	80 50	97 70	15 50
$5\frac{7}{16}$	90 25	110 00	15 50
$5\frac{15}{16}$	108 50	131 00	15 50

SPRING RUBBER.

Price.....Per pound, $1 50

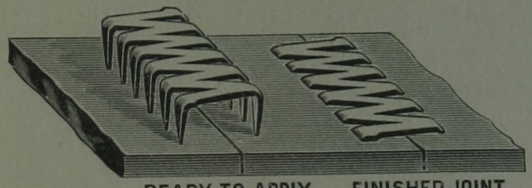
GASKET CUTTERS.

Price.....Each, $1 50

BELT PUNCHES.

LIST.

Numbers.	
2 to 6	Per dozen, $4 00
7 to 12	Per dozen, 6 00



BRISTOL'S BELT LACING.

LIST.

Numbers.	Per 100 Inches.
0	$1 00
1	1 50
2	2 00
3	2 50
10	1 10
11	1 65
12	2 20
13	2 75

BELT TIGHTENERS.

Takes from 2 to 24 inches.....$18 00

CANDLEWICK.

5 and 10 pound Bales.....Per pound, $0 40

MINERS' LAMPS.

Without Shade.....Per dozen, $5 00
With Shade.....Per dozen, 6 00

MINERS' CANDLESTICKS.

Price.....Per dozen, $6 00

MINERS' SPOONS.

Price.....Per dozen, $6 00

DUPLICATE PARTS OF THE LEYNER DRILLS.

Numbers.	LIST.	Price.
0	Rifle Bar Washer	$ 10
1	Piston Bushing	1 50
2	Piston Ring Spring	15
3	Chuck Key	1 25
4	Thrust Block	1 00
5	Piston (Bare)	20 00
6	Front Head Bolt	20
7	Front Head	7 00
8	Front Head Bushing	1 50
9	Front Head Buffer.	60
10	Front Head Buffer Plate	40
11	Cylinder (Bare)	26 00
12	Rifle Nut	3 00
13	Rifle Bar	6 50
14	Back Buffer Plate	40
15	Back Buffer	60
16	Back Head	8 00
17	Ratchet Head Safety	5 50
18	Oil Plug	15
19	Through Bolt Nut	08
20	Through Bolts, double nuts each end	50
21	Feed Screw	6 00
22	Goose Neck	3 25
23	Crank Bolt	05
24	Crank	1 35
25	Goose Neck Bolt	07
26	Guide Shell	9 00
27	Feed Nut	3 00
28	Piston Ring	1 00
29	Front Head Gland	2 75
30	Guide Shell Cap	2 00
31	U Bolt with Nuts	80
32	U Bolt Nuts	20
33	Valve Chest Head	1 25
34	Valve Buffer	30
35	Valve Buffer Plate	20
36	Valve Chest (Bare)	9 00
37	Valve	3 25
38	Bolt for Guide Shell Cap	06
39	Gland Bolt	20
40	Feed Nut Cap Screw	10
41	Pawl Spring	15
42	Pawl	1 25
43	Valve Chest Cap Screw	15
44	Rifle Bar Nut	75
45	Back Head Cover	1 50
46	Arm	8 00
47	Safety Clamp	2 25
48	Jack Screw	6 00
49	Jack Screw Nut	3 00
50	Column Foot	3 00
51	Arm Bolt	75
52	Arm Cap	2 00
53	Jack Screw Cup	Each, 75
54	Clip	1 00
55	Top Clamp Bolt	1 50
56	Clamp Cap	3 50
57	Lower Clamp Bolt	90
58	Main Clamp	4 00
59	Column Plate	Each, 4 00
60	Column Head	2 50
61	Column Pipe	5 00
62	Jack Screw Nut	3 75
63	Jack Screw	12 00
64	Base Block	2 75
65	Base Block Screw	30
	Chuck Wrench	3 00
	Valve Chest Wrench	75
	Oil Cans, Pocket	50
	Hose Couplings	Each, $2.25. Pair, 4 50

DUPLICATE PARTS

OF THE

INGERSOLL ECLIPSE DRILL SOLID CHUCK PISTON.

LIST.

Numbers.		DIAMETER OF CYLINDER. Inches.					
		A 1¾	B 2½	C 2¾	D 3	E 3⅛	F 3½
1	Front Cylinder Washers....Each	....	$ 75	$ 75	$ 75	$ 95	$ 95
2	Front Head Bolts and Nuts....Each	$ 06	12	12	15	15	15
3	Valve Guide and Nut....Each	2 25	2 50	2 50	2 50	2 50	2 50
4	Steam Chest (Bare)....Each	9 25	10 00	10 00	10 00	10 00	11 50
5	Valve....Each	2 75	3 00	3 00	3 00	3 00	3 25
6	Valve Washers....Each	15	20	20	20	20	25
7	Valve Buffers....Each	10	10	10	20	20	25
8	Steam Chest Studs and Nuts....Each	10	10	10	10	10	15
9	Exhaust Port Bushing Front....Each	1 00	1 00	1 00	1 00	1 00	1 00
10	Exhaust Port Bushing Back....Each	1 00	1 00	1 00	1 00	1 00	1 00
11	Split Gland....Each	2 00	2 50	2 50	2 50	2 50	3 00
12	Split Front Head....Each	7 25	8 00	8 00	8 00	8 50	9 00
13	Cylinder (Bare)....Each	23 00	24 50	27 50	30 00	32 00	34 50
14	Back Cylinder Washers....Each	30	75	75	75	95	95
15	Front Cylinder Buffers....Each	....	25	25	40	55	65
16	Thumb Screw....Each	10	10	10	10	10	10
17	Through Bolts and Nuts....Each	35	35	35	35	35	50
18	Shell Caps....Each	....	2 25	2 25	2 25	2 50	2 75
19	Shell without Caps....Each	7 50	10 00	10 00	10 00	10 00	11 75
20	Shell Cap Bolts....Each	....	05	05	05	05	05
21	Goose Neck....Each	....	3 50	3 50	3 50	3 50	4 50
22	Goose Neck Bolts and Nuts....Each	....	06	06	07	07	07
23	Back Head....Each	8 00	8 75	9 50	9 50	9 50	10 25
24	Pawl Set Screws....Each	05	05	05	05	05	05
25	Pawl Bolts....Each	08	08	08	08	08	10
26	Feed Nut Cap Bolts....Each	....	15	15	15	15	20
27	Rotating Pawls....Each	1 25	1 25	1 25	1 25	1 25	1 25
28	Pawl Springs....Each	08	08	08	08	08	08
29	Rotating Ratchet....Each	3 00	3 00	3 50	3 50	3 50	4 00
30	Rifle Bar....Each	6 25	6 50	7 00	7 00	7 00	7 75
31	Ratchet Nut....Each	50	50	75	75	75	1 00
32	Brass Nut....Each	2 00	2 00	2 50	2 50	2 50	2 50
33	Rotation Washer....Each	1 15	1 25	1 25	1 25	1 25	1 50
34	Feed Screw....Each	3 00	6 00	6 00	6 00	6 00	6 50
35	Feed Nut....Each	2 50	3 00	3 00	3 00	3 00	3 50
36	Feed Nut Cap....Each	1 00	1 00	1 25	1 25	1 25	1 50
37	Crank....Each	1 50	1 50	1 50	1 50	1 50	1 50
38	Crank Bolt and Nut....Each	20	20	20	20	20	20
39	Piston (Bare)....Each	18 00	21 00	23 50	25 00	26 50	30 00
40	Piston Bushings....Each	1 25	1 50	1 50	2 00	2 00	2 25
41	U Bolts and Nuts....Each	80	80	80	80	80	80
42	Round Keys....Each	75	1 00	1 00	1 00	1 00	1 25
43	Piston Rings....Each	50	75	1 00	1 00	1 00	1 00
44	Piston Ring Springs....Each	....	20	20	20	20	20
45	Piston Ring Band....Each	....	1 00	1 00	1 00	1 00	1 24
46	Pawl Spring Plunger....Each	....	25	25	25	25	25
47	Pawl Washers....Each	10	10	10	10	10	10
48	Back Cylinder Buffers....Each	15	25	25	40	55	65
49	U Bolt Nuts....Each	15	15	15	15	15	15
50	Steam Chest Covers....Each	75	75	75	75	75	75
51	Gland Bolts and Nuts....Each	05	06	06	07	07	07
59	Special Front Head for Air....Each	7 25	8 00	8 00	8 00	8 50	9 00
60	Leather....Each	20	25	25	25	25	30
70	Back Bolt....Each	75	1 00	1 00	1 00	1 00	1 00

HOSE MENDERS.

LIST.

Size.....Inches,	¾	1
Price.....Per dozen,	$1 50	2 00

HOSE PLIERS.

LIST.

Numbers.		
1	½ to 1 inch, inclusive.....Each,	$0 50
2	1¼ to 2½ inch, inclusive.....Each,	75

HOSE STRAPS.

WIRE.

LIST.

Numbers.....	2	4	6	8	10	12	14	16
Size Hose.....Inches,	½	½	¾	¾	1	1	1¼	1¼
Length.....	3⅜	3¾	4⅛	4½	5	5⅜	6	6⅜
Price.....Per dozen,	$0 40	0 40	0 60	0 60	0 80	0 80	1 00	1 00

HOSE SPANNERS.

Any pattern furnished to order.

COMPRESSION HOSE BIBBS.

SCREWED FOR IRON PIPE WITH SHOULDER.

LIST.

Size.....Inches,	⅜	½	¾	1	1¼	1½	2
Rough.....Per dozen,	$10 50	11 50	21 00	36 00	52 00	80 00	160 00
Finished.....Per dozen,	11 00	12 00	22 00	40 00	60 00	92 00	180 00
Nickel Plated..Per dozen,	13 00	14 50	24 50	43 50	.....	.....	.....
Silver Plated..Per dozen,	19 00	21 00	37 00	66 00	.....	.....	.....

LEVER HANDLE.

SCREWED FOR IRON PIPE WITH SHOULDER.

LIST.

Size.....Inches,	½	¾	1	1¼	1½	2	2½	3
Rough.....Per dozen,	$16 00	25 00	38 00	60 00	84 00	170 00	270 00	400 00
Finished.....Per dozen,	17 00	28 00	42 00	68 00	96 00	190 00	310 00	460 00
Nickel Plated..Per dozen,	19 50	30 50	45 00	.....	.....	.....	.....	.....
Silver Plated..Per dozen,	26 00	43 00	68 00	.....	.....	.....	.....	.....

HANCOCK INSPIRATORS.

LIST.

Numbers	7½	8¾	10	12½	15	17½	20
Suction and Feed Connections.....Inches,	⅜	½	½	¾	¾	1	1
Steam Connections.....Inches,	⅜	⅜	⅜	½	½	¾	¾
Gallons per Hour, 60-pounds Pressure.....	60	85	120	220	300	430	540
Horse-Power.....	6-8	8-10	10-15	18-25	25-35	35-50	45-60
Price.....Each,	$16 00	18 00	20 00	25 00	30 00	40 00	45 00

Numbers	22½	25	30	35	40	45	50
Suction and Feed Connections.....Inches,	1¼	1¼	1½	1½	2	2	2½
Steam Connections.....Inches,	1	1	1¼	1¼	1½	1½	2
Gallons per Hour, 60-pounds Pressure.....	700	900	1260	1740	2230	2820	3480
Horse-Power.....	60-90	75-100	100-150	140-210	190-275	240-350	290-430
Price.....Each,	$55 00	60 00	75 00	90 00	110 00	125 00	150 00

TABOR'S PATENT STEAM ENGINE INDICATOR.

Indicator complete (nickel plated), with one spring, one boxwood scale, two cocks, wrenches for the Indicator, one screwdriver, bottle watch oil, one extra drum spring and cord, box of pencil leads, all enclosed in a neat case with heavy nickel plated trimmings, $85.00.

EXTRAS.

LIST.

Patent Duplex Spring	Each,	$5 00
Boxwood Scale	Each,	50
Steel Scale	Each,	1 25
Cocks	Each,	2 75
Elbows	Each,	2 50
Three Way Cock	Each,	7 00
Single Carrying Pulley	Each,	75
Double Carrying Pulley	Each,	1 50
Parallel Rule	Each,	7 00
Clamps	Each,	3 00

DRILL CHUCKS.

WESTCOTT'S LITTLE GIANT---"DOUBLE GRIP."

EXTRA STRONG SCREWS.

LIST.

Numbers.	Approximate Diameter. Inches.	Holding Drills.	Price.
0	2½	0 to ½ inch	$ 8 00
1	3	0 to ¾ inch	9 00
2	3½	0 to 1 inch	10 00
2½	4	0 to 1 inch, extra strong	11 00
3	6	0 to 1½ inch	18 00
4	6¼	0 to 2 inch	20 00
5	7	½ to 2⅝ inch	25 00
6	9	3 inch capacity	.....

LATHE CHUCKS.

LIST.

Numbers.	One Set Jaws.	Two Set Jaws.	DIAMETER. INCHES.	
			Hole.	Face Plate.
2½	$ 6 00	$ 7 20	5/8	...
3	8 00	9 60	5/8	2 7/8
4	9 60	11 50	5/8	3 1/16
5	12 00	14 40	3/4	3 3/4
6	14 40	17 25	1½	4 3/4
7½	16 00	19 20	2	4 3/4
9	19 20	23 00	2½	5 3/4

FILE CLEANERS.

LIST.

Numbers.
1 ..... Per dozen, $4 00
3 With Brush ..... Per dozen, 6 00

GUMMER CUTTERS.

DISSTON'S.

LIST.

Diameter ..... Inches,	½	5/8	¾	⅞	1
Size Hole ..... Inches,	5/16	5/16	5/16	5/16	9/16
Price ..... Each,	$1 00	1 00	1 20	1 40	1 60

MIXTER'S

LIST.

Diameter ..... Inches,	½	5/8	¾	⅞	1
Size Hole ..... Inches,	5/16	5/16	½	½	½
Price ..... Each,	$1 00	1 00	1 20	1 40	1 60

RIDGE CAP.

8 foot lengths ..... Per foot, $0 15

RIDGE TIMBERS.

3 foot lengths ..... Per foot, $....

SCREW RAIL BENDERS, OR "JIM CROW."

Best wrought steel and iron, with machine-cut, square thread screw.

LIST.

Numbers	1	2	3	3½	4
For Steel Rails, pounds per yard, up to	20	45	65	75	90
For Iron Rails, pounds per yard, up to	30	55	75	85	100
Weight, with Lever ..... Pounds,	65	100	140	155	185
Span to center of Claws ..... Inches,	16	20	24	28	28
Diameter of Screw ..... Inches,	2	2¼	2½	2⅝	2¾
Price ..... Each,	$21 00	30 00	42 00	50 00	59 00

COAL SHOVELS.

CHISHOLM.

LIST.

Numbers.		
321	Per dozen,	$14 00
322	Per dozen,	15 00
323	Per dozen,	16 00

SHOVEL HANDLES.

LIST.

Long Handle	Per dozen,	$4 00
D Handle	Per dozen,	4 50

WHEELBARROW TRAYS.

STEEL.

LIST.

Numbers.		
4	Each,	$ 5 50
8	Each,	6 50
10	Each,	10 00

SHINGLE BANDS.

¾x12 inches	Per pound,	$0 10

WIRE ROPE TRAMS.

PRICES ON APPLICATION.

ENGLISH BRATTICE CLOTH.

FOR THE PROPER VENTILATION OF COAL MINES.

It is prepared from the best quality of fibre woven for that purpose, and coated with an anti-rot, vegetable compound, preserving it from the damp of the mine, and making it nearly air tight. More durable than old canvas or lumber, increasing the amount of air conveyed, and in the end is the cheapest.

The weight per roll is not a guide to quality or durability, as the weight could be greatly increased by adding a mineral substance in the coating, which we object to use on account of its tendency to rot.

If any customers desire to know the weights, we will gladly send same with the samples.

The quality is graded as follows:

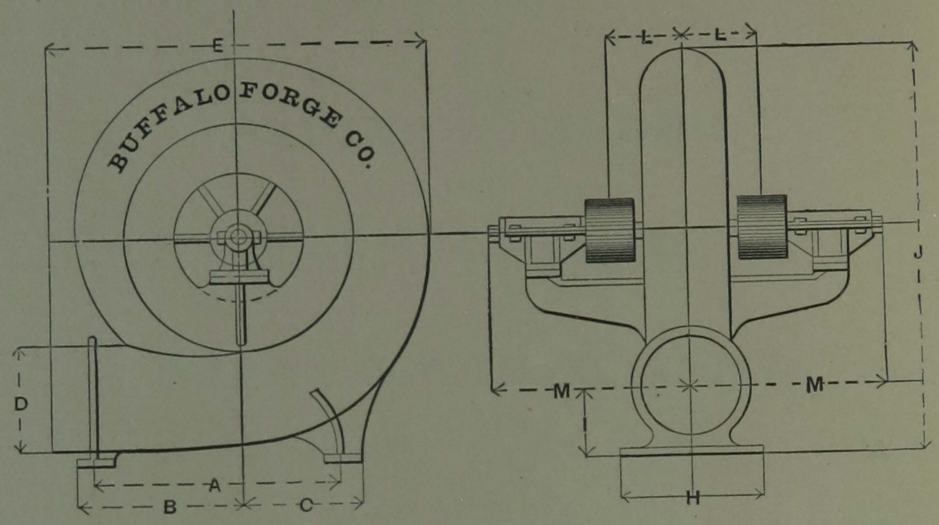
Rolls 50 yards long	Marked,	M	JS	F	MC3	H	S	T
Price	Per square yard,	$0 19	0 20	0 22	0 26	0 28	0 30	0 32

Width, 36, 42, 48, 60, 72, 84 and 96 inches.

Fire proof Brattice cloth, "I.F." brand, 30 cents per square yard.

BUFFALO STEEL PRESSURE BLOWERS.

FOR CUPOLAS AND FORGE FIRES.



PRINCIPAL DIMENSIONS—IN INCHES.

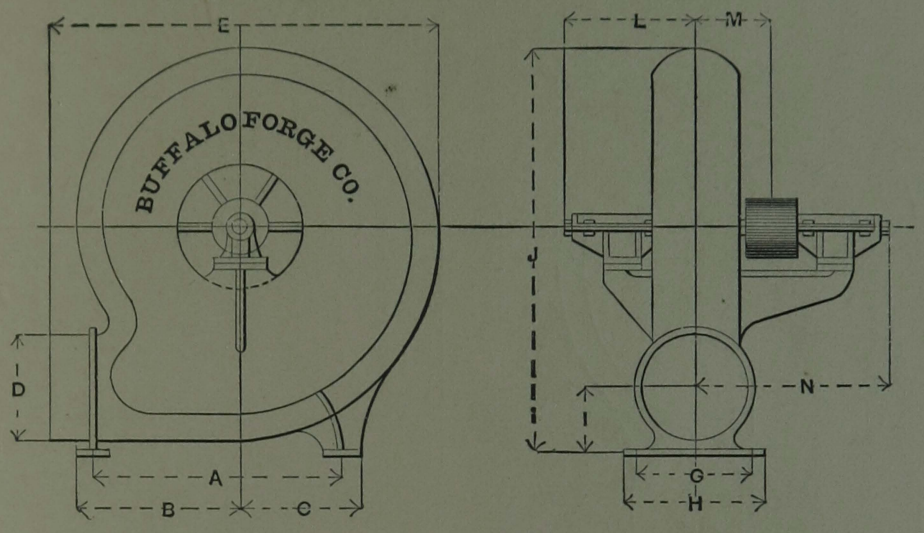
Numbers.	A	B	C	D	E	G	H	I	J	L	M	Size of Pulley.		Weight.	
												Diam.	Face.	Not Packed	Packed
1	7⅛	6	2¾	3½	12⅜	6	8	2⅞	12½	3	14½	2½	1¾	30	45
2	10	7⅝	4⅜	4	15	6¼	7¼	2⅜	15¼	4⅜	16½	2½	2¼	47	70
3	12¾	10¼	4¾	4¾	19½	7	8½	3⅝	19¼	4¾	22¼	3¼	2⅝	75	95
4	15	11⅝	5½	5	22⅝	9	11	4⅞	24	4⅝	24½	4	3	118	135
5	15¾	12¾	5½	5⅜	26¼	11½	13½	4¾	25¾	4¾	26	4¼	3	165	190
6	18¾	14	7½	6	29	13	15	6	30	5⅝	29	4½	3½	210	235
7	21½	14½	10	7¼	31	13½	15¾	7	35¾	6¾	37¾	5	4½	310	335
8	29½	16	13½	8¾	37	15	18	8⅜	37¾	7¾	43¾	6	4½	450	490
9	32	19½	16	10	42	16	19	9½	44	8⅜	46½	7	5	620	660
10	40	21½	22	12¼	53½	17½	20	10½	56	9½	48½	8	5¾	920	975
11	46½	25¾	25	14⅜	61¼	20¾	23½	11¼	65¾	10⅞	50¾	9	6¼	1300	1400
11½	53	30	28	16½	66	23	27	12	75⅝	12¼	53	10	7	1700	1800

Nos. 1 to 6, inclusive, have but one pulley; Nos. 7 to 12 have two pulleys. When so desired, we can furnish any of these sizes with two pulleys, to order.

FOR PRICES SEE PAGE 167.

BUFFALO "B" VOLUME BLOWERS.

FOR BOILERS, HEATING FURNACES, FORGES AND VENTILATION.



PRINCIPAL DIMENSIONS—IN INCHES.

Numbers.	A	B	C	D	E	G	H	I	J	L	M	N	Size of Pulley		Weight.	
													Diam.	Face.	Not P'k'd.	P'k'd
1	10	7⅝	4⅜	4	15	6¼	7¼	2⅜	15¼	6½	4⅜	10¼	2¾	2¼	44	75
2	12¾	10¼	4¾	4¾	19½	7	8½	3⅝	19¼	6¼	4¼	10½	3¼	2⅝	75	115
3	16	12⅛	6⅛	7½	25⅜	9½	12	5½	25	10⅜	6⅛	11⅜	4	3¼	165	250
4	20½	13¼	9¾	9	27¾	12¾	15¼	6	28¼	9½	6⅜	17⅜	5	4	210	275
5	20½	16¼	7¾	10½	31½	16¼	18	6¾	32	12	8	18½	5¾	4½	275	335
6	27¼	18¾	11¾	12	38	15	17	7	39¼	14	9	23	6½	5½	357	420
7	30	20¾	12¾	14	42	16	18	9	43	15½	10½	25¾	7½	6½	515	585
8	34½	23¾	13¼	16½	47	18	20	9½	47½	15	12	24¼	8½	7½	640	720
9	43¼	28	18¾	18	55½	20½	23	11¼	55¾	18½	14	29	9½	8½	1035	1100
10	44½	31	19½	21	65½	21	24	13¼	68	18¾	16¼	34¼	12	10	1500	1620
11	54½	36	24	24	73	25	28	17	79	25	19	25	14	12	2500	2575

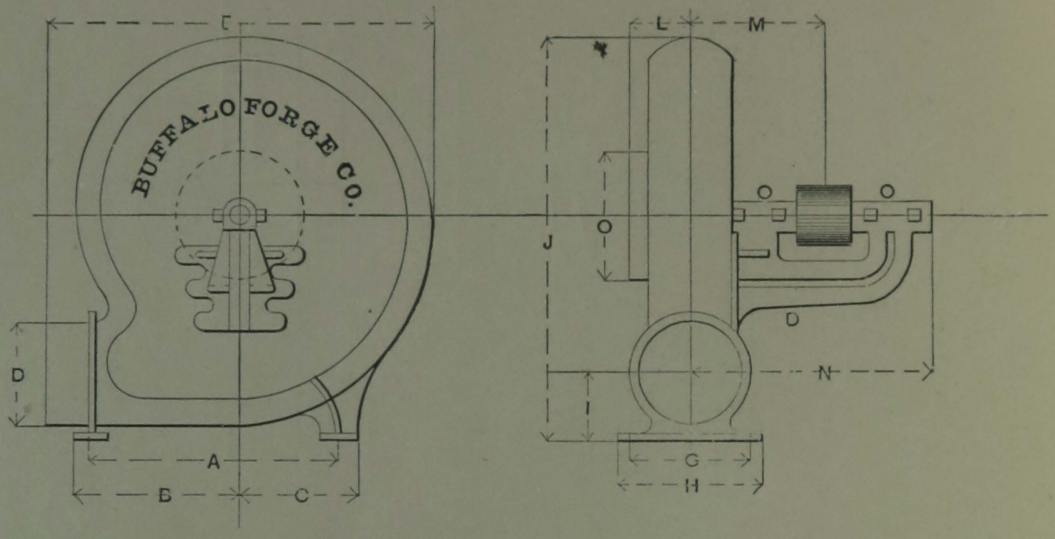
The above represents a Blower with pulley on the right hand side, as usually made.

We can furnish these Blowers left hand to order, on short notice, and the regular machines from stock.

FOR PRICES SEE PAGE 166.

BUFFALO "B" VOLUME EXHAUSTERS.

WITH OVERHUNG WHEELS.



PRINCIPAL DIMENSIONS—IN INCHES.

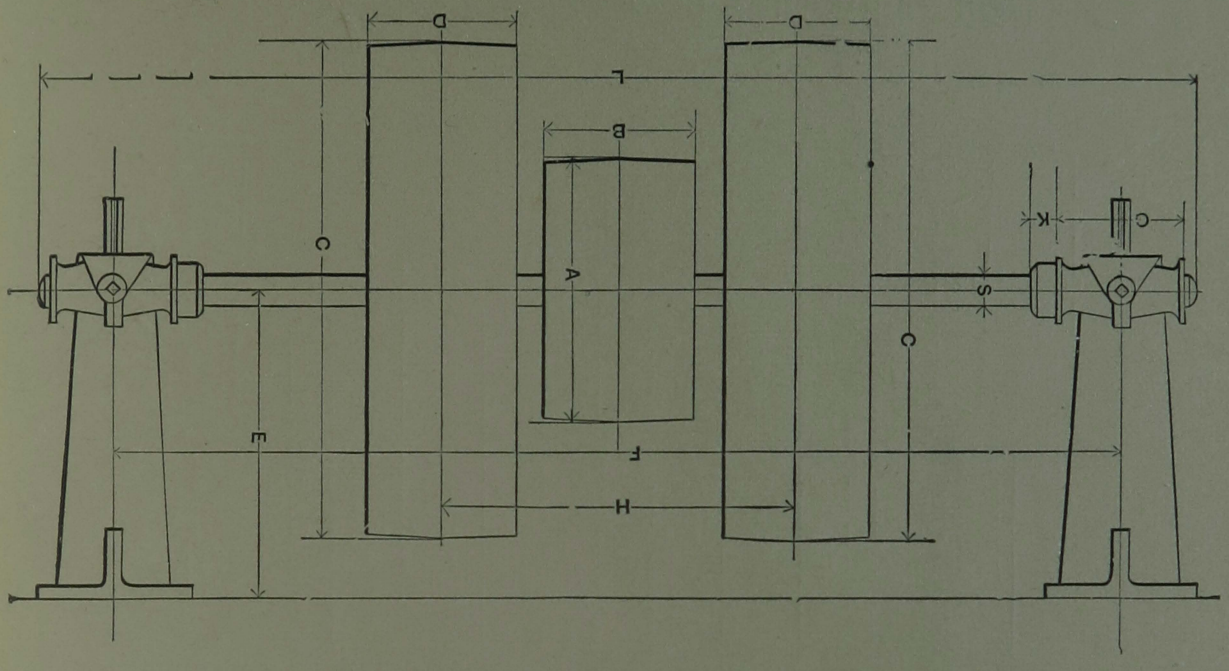
Numbers.	A	B	C	D	E	G	H	I	J	L	M	N	O	Size of Pulley.	
														Diam.	Face.
1	10	7 5/8	4 3/8	5	15	6 1/4	7 1/4	2 3/8	15 1/4	4	7	12	5	2 3/4	2 1/4
2	12 3/4	10 1/4	4 3/4	6	19 1/2	7	8 1/2	3 5/8	19 1/4	4 1/2	9 1/2	14 3/4	6	3 1/4	2 5/8
3	15 1/4	11 1/2	6 1/2	7 1/2	25 1/2	11 1/2	13 1/2	4 7/8	25 5/8	4 5/8	11 5/8	19	7 1/2	4	3 1/4
4	20 1/2	13 1/2	10	9	27 1/4	13 1/4	15	6 1/4	28	6	12	19 1/2	9	5	4
5	20 1/2	16 1/4	7 3/4	10 1/2	31 1/2	16 1/4	18	6 3/4	32	7	13 1/4	22 1/4	10 1/2	5 3/4	4 1/2
6	27 1/2	18 3/4	11 3/4	12	39	15	17	7	39 1/4	8	15 1/2	25 1/4	12	6 1/2	5 1/2
7	30	20 3/4	12 3/4	14	42	16	18	9	43	9	17 1/2	29 1/2	14	7 1/2	6 1/2
8	34 1/2	23 3/4	13 1/4	16 1/2	47	18	20	9 1/2	47 1/2	9 3/4	19 1/4	32 1/4	16 1/2	8 1/2	7 1/2
9	43 1/4	28	18 3/4	18	55 1/2	20 1/2	23	11 1/4	55 3/4	12 3/4	14	29	18	9 1/2	8 1/2
10	44 1/2	31	19 1/2	21	65 1/2	21	24	13 1/4	68	14 3/4	16 1/4	31 1/4	21	12	10

The above represents the Exhauster with the pulley on the right hand side, as usually made. Can furnish left-hand, when ordered.

FOR PRICES SEE PAGE 166.

BUFFALO IMPROVED COUNTERSHAFTS.

FOR STEEL PRESSURE BLOWERS.



PRINCIPAL DIMENSIONS—IN INCHES.

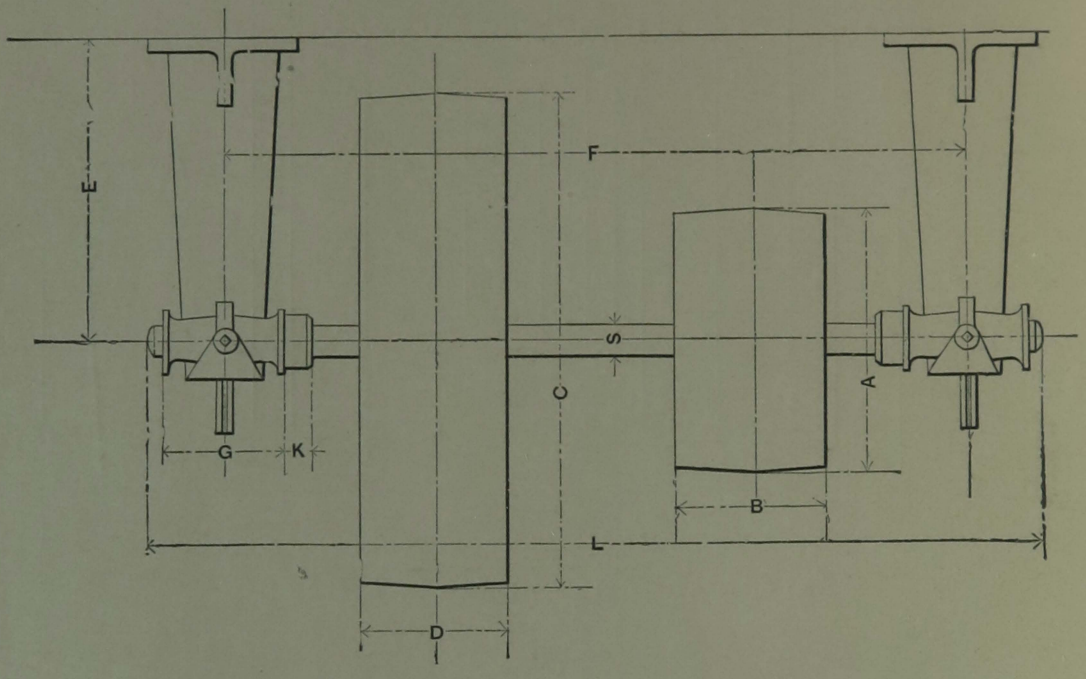
LIST.

Numbers of Countershaft.	S	L	A	B	C	D	E	F	G	H	K	Numbers of Steel Pressure Blower.	Price One Driving Pulley.	Price Two Driving Pulleys.
1	7/8	19¾	4	3	12	1¾	6⅞	15½	4	..	7/8	1	$ 8 00	.....
2	1	21½	5	3½	14	2¼	8¼	17¼	4	..	1	2	10 00	.....
3	1⅛	23⅛	6	4	16	2⅝	9¼	18⅞	4	..	1⅛	3	12 00	.....
4	1¼	26¼	7	4½	18	3	9¼	21½	4½	..	1½	4	16 00	.....
5	1⅜	27¾	8	4½	21	3	10¾	22½	5	..	..	5	20 00	.....
6	1⅝	31	9	5	26	3½	12⅞	25¼	5½	..	2	6	25 00	.....
7	1¾	39½	10	5½	30	4½	15⅛	33¼	6	13½	2¼	7	30 00	$35 00
8	1 5/16	44	12	6	32	4½	16¼	37¼	6½	15½	2½	8	40 00	45 00
9	2¼	48½	14	6	36	5	18⅛	41¼	7	16¾	2¾	9	50 00	60 00
10	2 7/16	52½	16	8	40	5¾	20½	44¾	7½	19	3	10	70 00	80 00
11	2¾	62	17	10	42	6½	23½	51	9	22½	3	11	80 00	90 00
11½	3	73¼	18	12	44	7	23½	64	9	24½	3¼	11½	90 00	100 00
12	3	76¼	18	12	44	8	23½	67	9	24½	3¼	12	100 00	110 00

Nos. 1 to 6, inclusive, have but one pulley; Nos. 7 to 12 have two pulleys.

BUFFALO IMPROVED COUNTERSHAFTS.

FOR "B" VOLUME BLOWERS AND EXHAUSTERS.



DIMENSIONS—IN INCHES.

LIST.

Numbers of Counter-shaft.	S	L	A	B	C	D	E	F	G	K	Numbers of Blower or Exhauster.	Price.
1	1⅛	22¾	6	4	16	2¼	9¼	18½	4	1⅛	1	$12 00
2	1¼	25⅞	7	4½	18	2⅝	9¼	21⅛	4½	2	2	14 00
3	1⅜	28	8	4½	21	3¼	10¾	22¾	5	1¾	3	18 00
4	1⅝	31	9	5	26	4	12⅞	25¼	5½	2	4	24 00
5	1¾	34¼	10	5½	30	4½	15⅛	28	6	2¼	5	30 00
6	1 5/16	37¾	12	6	32	5½	16¼	31	6½	2½	6	40 00
7	2¼	40¼	14	6	36	6½	18⅛	33	7	2¾	7	50 00
8	2 7/16	46¾	16	8	40	7½	20½	39	7½	3	8	65 00
9	2¾	51	18	8	42	8½	23½	40	9	3	9	80 00
10	3	56	20	9	44	10	23½	45	9	3¼	10	85 00
11	3	61	22	10	48	12	23½	50	9	3¼	11	90 00

TABLES

AND

...USEFUL INFORMATION...

CONTENTS

...OF...

CYLINDERS AND PIPES IN CUBIC FEET AND GALLONS.

TRAUTWINE.

Diameter. Inches.	FOR 1 FOOT IN LENGTH.		Diameter. Inches.	FOR 1 FOOT IN LENGTH.		Diameter. Inches.	FOR 1 FOOT IN LENGTH.	
	Cubic Feet.	Gallons of 231 Cubic Inches.		Cubic Feet.	Gallons of 231 Cubic Inches.		Cubic Feet.	Gallons of 231 Cubic Inches.
1/4	.0003	.0025	4 1/4	.0985	.7369	10 1/2	.6013	4.498
5/16	.0005	.004	4 1/2	.1104	.8263	10 3/4	.6303	4.715
3/8	.0008	.0057	4 3/4	.1231	.9206	11	.66	4.937
7/16	.001	.0078	5	.1364	1.02	11 1/4	.6903	5.164
1/2	.0014	.0102	5 1/4	.1503	1.125	11 1/2	.7213	5.396
9/16	.0017	.0129	5 1/2	.165	1.234	11 3/4	.753	5 633
5/8	.0021	.0159	5 3/4	.1803	1.349	12	.7854	5.875
11/16	.0026	.0193	6	.1963	1.469	12 1/2	.8522	6.375
3/4	.0031	.023	6 1/4	.2131	1 594	13	.9218	6.895
13/16	.0036	.0269	6 1/2	.2304	1.724	13 1/2	.994	7.436
7/8	.0042	.0312	6 3/4	.2485	1.859	14	1.069	7.997
15/16	.0048	.0359	7	.2673	1 999	14 1/2	1.147	8.578
1	.0055	.0408	7 1/4	.2867	2.145	15	1.227	9.180
1 1/4	.0085	.0638	7 1/2	.3068	2.295	15 1/2	1.31	9.801
1 1/2	.0123	.0918	7 3/4	.3276	2.45	16	1.396	10.44
1 3/4	.0167	.1249	8	.3491	2.611	16 1/2	1 485	11.11
2	.0218	.1632	8 1/4	.3712	2.777	17	1.576	11.79
2 1/4	.0276	.2066	8 1/2	.3941	2.948	17 1/2	1.67	12.49
2 1/2	.0341	.255	8 3/4	.4176	3.125	18	1.767	13.22
2 3/4	.0412	.3085	9	.4418	3.305	18 1/2	1.867	13.96
3	.0491	.3672	9 1/4	.4667	3.491	19	1.969	14.73
3 1/4	.0576	.4309	9 1/2	4922	3.682	19 1/2	2.074	15 51
3 1/2	.0668	.4998	9 3/4	.5185	3.879	20	2.182	16 32
3 3/4	.0767	.5738	10	.5454	4.08	22	2 640	19.75
4	.0873	.6528	10 1/4	.573	4.286	25	3.409	25.50

To find contents of larger pipe than given above:

Take 1/2 the size and multiply by 4, or take 1/4 the size and multiply by 16, thus:

Contents of pipe 30 inches diameter = 9.180 (contents of 15-inch pipe) X 4 = 36.72 gallons.

Contents of pipe 50 inches diameter = .8522 (contents of 12 1/2-inch pipe) X 16 = 13.6352 cubic feet.

Cubic inches in a gallon = 231.

Gallons in a cubic foot = 7.4805.

A cubic foot of water = 62 1/3 pounds, usually taken at 62 1/2 pounds.

Weight of a gallon of water = 8 1/3 pounds.

TABLE FOR EQUALIZING PIPES.

The size of main pipe is given in the column at the left. The number of branches is given in the line on top, and the proper size of branches is given in the body of the table on the line of each main and beneath the desired number of branches.

In commercial sizes the nominal 1¼-inch pipe is generally over-size; often as large as 1⅜. It is safe to call it 1.3 inches, and it is so figured in the table. Exact sizes are given for branch pipes. The designer of the pipe system can thus better select the commercial sizes to be used.

Size of Main Pipe. Inches.	NUMBER OF BRANCHES.												
	2	3	4	5	6	7	8	9	10	11	12	13	14
1	.758	.644	.574	.525	.488	.459	.435	.415	.398	.383	.370	.358	.348
1¼	985	.838	.747	.683	.635	.597	.556	.540	.518	.498	.482	.466	.452
1½	1.14	.967	861	.788	.733	.689	.653	.623	.597	.575	.555	.538	.522
2	1.52	1.29	1.15	1.05	.977	.918	.870	.830	.796	.766	.740	.717	696
2½	1.89	1 61	1.44	1.31	1.22	1 15	1.09	1.09	.995	958	.925	.896	.870
3	2.27	1.92	1.72	1.58	1.47	1.38	1 31	1.25	1.19	1.15	1 11	1.08	1.04
3½	2.65	2.26	2.01	1.84	1.71	1 61	1.52	1.45	1.39	1.34	1.30	1.25	1.22
4	3.03	2.58	2 30	2.10	1.95	1.84	1 74	1.66	1.59	1.53	1.48	1 43	1 39
4½	3.41	2.90	2.58	2.36	2.20	2.07	1 96	1.87	1.79	1.72	1 67	1.61	1 57
5	3.79	3.22	2.87	2.63	2.44	2.30	2.18	2.08	1 99	1.92	1 85	1.79	1.74
6	4.55	3.87	3.45	3.15	2.93	2.75	2.61	2.49	2.39	2.30	2.22	2.15	2 09
7	5.30	4.51	4.02	3.68	3.42	3.21	3.05	2 91	2.79	2.68	2.59	2.51	2.44
8	6.06	5.16	4.59	4.20	3.91	3.67	3.48	3.32	3.18	3.09	2.96	2.87	2 78
9	6.82	5.80	5 17	4.73	4.40	4.13	3.92	3.74	3 58	3.45	3.33	3.23	3 13
10	7.58	6.44	5.74	5.25	4.88	4.59	4.35	4.15	3.98	3.83	3.70	3.59	3.48
12	9.08	7.73	6.89	6 30	5.86	5.51	5.22	4.98	4.78	4.60	4.44	4.30	4.18

APPROXIMATE QUANTITIES OF WATER DELIVERED PER HOUR BY SINGLE-ACTING PUMPS.

From 2-inch to 6-inch diameter by 4-inch, 6-inch, 8-inch and 12-inch length of stroke, respectively, and worked at 30 strokes per minute. Table indicates gallons delivered per minute by pump with stroke indicated.

Stroke. Inches.	DIAMETER OF WORKING BARREL OR CYLINDER, INCHES.										
	2	2¼	2½	3	3½	4	4½	5	6	7	8
4	70	90	120	160	220	280	360	450	650	885	1155
6	105	135	180	240	330	420	540	675	975	1326	1721
8	140	180	240	320	440	560	720	900	1300	1770	2310
10	175	225	300	400	550	700	900	1125	1625	2212	2887
12	210	270	360	480	660	840	1080	1350	1950	2652	3442

If pump be worked at 40 strokes per minute, the quantity delivered will be, of course, one-third more than named above; if at 20 strokes only, one-third less water will be delivered, and so on.

Double-Barrel Pumps having two cylinders each of above diameters, or Double-Acting Pumps, will deliver twice the quantities named above.

FRICTION-LOSS IN POUNDS PRESSURE PER SQUARE INCH.

For each 100 feet of length in different size clean iron pipes, discharging given quantities of water per minute. Also velocity of flow in pipe, in feet per second.

G. A. Ellis, C. E.

Gallons Discharged Per Minute.	½ Inch.		¾ Inch.		1 Inch.		1¼ Inch.		1½ Inch.		2 Inch.		2½ Inch.		3 Inch.		4 Inch.		6 Inch.		Gallons Discharged Per Minute.
	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	
5	8.17	24.6	3.63	3.3	2.04	0 84	1.31	0.31	0.91	0.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
10	16.3	96.0	7.25	13.0	4.08	3.16	2.61	1.05	1.82	0.47	1.02	0 12	.....	.....	.....	.....	.....	.....	.....	.....	10
15	.....	.....	10.9	28.7	6.13	6 98	3.92	2.38	2.73	0.97	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15
20	.....	.....	14.5	50.4	8 17	12.3	5.22	4.07	3.63	1.66	2.04	0.42	.....	.....	.....	.....	.....	.....	.....	.....	20
25	.....	.....	18.1	78.0	10 2	19.0	6.53	6.40	4.54	2.62	.....	.....	1 63	0.21	1 13	0 10	.....	.....	.....	.....	25
30	.....	.....	.....	.....	12.3	27.5	7 84	9.15	5.45	3.75	3.06	0.91	.....	.....	.....	.....	.....	.....	.....	.....	30
35	.....	.....	.....	.....	14.3	37.0	9.14	12 4	6.36	5 05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35
40	.....	.....	.....	.....	16.3	48.0	10.4	16.1	7.26	6 52	4.09	1.60	.....	.....	.....	.....	.....	.....	.....	.....	40
45	.....	.....	.....	.....	.....	.....	11.7	20.2	8.17	8.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45
50	.....	.....	.....	.....	.....	.....	13.1	24.9	9.08	10.0	5 11	2.44	3.26	0.81	2.27	0.35	1.28	0.09	.....	.....	50
75	.....	.....	.....	.....	.....	.....	19.6	56.1	13.6	22 4	7.66	5.32	4.90	1.80	3 40	0.74	.....	.....	.....	.....	75
100	.....	.....	.....	.....	.....	.....	.....	.....	18.2	39.0	10 2	9.46	6.53	3.20	4.54	1.31	2.55	0.33	1.13	0.05	100
125	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.8	14.9	8.16	4.89	5.67	1.99	.....	.....	.....	.....	125
150	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15.3	21.2	9.80	7.00	6.81	2.85	3.83	0.69	1.70	0.10	150
175	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17.1	28 1	11.4	9.46	7.94	3 85	.....	.....	.....	.....	175
200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20.4	37.5	13.1	12.48	9.08	5.02	5.11	1.22	2.27	0.17	200
250	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16 3	19.66	11.3	7.76	6.39	1.89	2.84	0.26	250
300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19.6	28 06	13.6	11.2	7.66	2.66	3.40	0.37	300
350	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15.9	15 2	8.94	3.65	3 97	0.50	350
400	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.2	19.5	10 2	4.73	4.54	0.65	400
450	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20.4	25.0	11.5	6.01	5 11	0 81	450
500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22.7	30.8	12 8	7.43	5.67	0.96	500

Gallons Discharged Per Minute.	6 Inch.		8 Inch.		10 Inch.		12 Inch.		14 Inch		16 Inch.		18 Inch.		20 Inch.		24 Inch.		30 Inch.		Gallons Discharged Per Minute.
	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	Veloc. in Pipe Per Second.	Friction-Loss in Pounds.	
250	2.84	0.26	1.59	0.07	1.02	0.03	0.71	0.01	.....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	250
500	5.67	0.98	3.19	0.25	2.04	0 09	1.42	0 04	1.04	0.017	0 80	0.009	0.63	0.005	.....	.....	.....	.....	.....	.....	500
750	8.51	2.21	4.79	0.53	3.06	0 18	2 13	0.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	750
1000	11.3	3.88	6.38	0.94	4.08	0.32	2.84	0.13	2.08	0.062	1.60	0.036	1.26	0.020	1.02	0.012	0.72	0.005	0.45	0.002	1000
1250	.....	.....	7.97	1.46	5.10	0.49	3.55	0 20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1250
1500	.....	.....	9.57	2.09	6.12	0.70	4.26	0.29	3.13	0.135	2.39	0 071	1.89	0.040	.....	.....	.....	.....	.....	.....	1500
1750	.....	.....	.....	.....	7.15	0.95	4.96	0.38	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	1750
2000	.....	.....	.....	.....	8.17	1.23	5 67	0.49	4.17	0 234	3.19	0.123	2.52	0 071	2.04	0.042	1.44	0.020	0.91	0.006	2000
2250	.....	.....	....	.....	.....	.....	6.38	0.63	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2250
2500	.....	.....	.....	.....	....	.....	7.09	0.77	5.21	0.362	3.99	0 188	3.15	0.107	.....	.....	.....	....	.....	....	2500
3000	.....	.....	.....	.....	.....	.....	8.51	1.11	6 25	0.515	4 79	0.267	3.78	0.150	3.06	0.091	2 16	0.047	1.36	0.012	3000
3500	.....	.....	....	.....	....	.....	.....	....	7.29	0 697	5 59	0.365	4.41	0.204	.....	.....	.....	.....	....	.....	3500
4000	.....	.....	.....	.....	.....	.....	.....	.....	8 34	0.910	6.38	0.472	5.04	0 263	4.08	0.158	2.88	0.067	1.82	0.022	4000
4500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7.18	0.593	5.67	0.333	.....	.....	.....	.....	.....	.....	4500
5000	.....	.....	.....	.....	....	.....	.....	.....	.....	.....	7.98	0.730	6.30	0 408	5 11	0.244	3.60	0.102	2.27	0.035	5000
6000	.....	.....	.....	.....	....	.....	....	.....	.....	.....	.....	.....	7.56	0.585	6 13	0.348	4 32	0.146	2 72	0.048	6000
7000	.....	.....	.....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	7.15	0.472	5.04	0.196	3.18	0.065	7000
8000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8.17	0.612	5.76	0.255	3.63	0.083	8000
9000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.47	0 323	4.08	0.105	9000
10000	.....	.....	.....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7.19	0.398	4.54	0.131	10000

TABLE OF THEORETICAL HORSE-POWER REQUIRED TO RAISE WATER TO DIFFERENT HEIGHTS.

Gallons Per Minute.	HEIGHT, FEET.										
	5	10	15	20	25	30	35	40	45	50	60
5	.006	.012	.019	.025	.031	.037	.044	.05	.06	.06	.07
10	.012	.025	.037	.050	.062	.075	.087	.10	.11	.12	.15
15	.019	.037	.056	.075	.094	.112	.131	.15	.17	.19	.22
20	.025	.050	.075	.100	.125	.150	.175	.20	.22	.25	.30
25	.031	.062	.093	.125	.156	.187	.219	.25	.28	.31	.37
30	.037	.075	.112	.150	.187	.225	.262	.30	.34	.37	.45
40	.050	.100	.150	.200	.250	.300	.350	.40	.45	.50	.60
50	.062	.125	.187	.250	.312	.375	.437	.50	.56	.62	.75
60	.075	.150	.225	.300	.375	.450	.525	.60	.67	.75	.90
75	.093	.187	.281	.375	.469	.562	.656	.75	.84	.94	1.12
90	.112	.225	.337	.450	.562	.675	.787	.90	1.01	1.12	1.35
100	.125	.250	.375	.500	.625	.750	.875	1.00	1.12	1.25	1.50
150	.187	.375	.562	.750	.937	1.125	1.312	1.50	1.69	1.87	2.25
200	.250	.500	.750	1.000	1.250	1.500	1.750	2.00	2.25	2.50	3.00
300	.375	.750	1.125	1.500	1.875	2.250	2.625	3.00	3.37	3.75	4.50

Gallons Per Minute.	HEIGHT, FEET.										
	75	90	100	125	150	175	200	250	300	350	400
5	.09	.11	.12	.16	.19	.22	.25	.31	.37	.44	.50
10	.19	.22	.25	.31	.37	.44	.50	.62	.75	.87	1.00
15	.28	.34	.37	.47	.56	.66	.75	.94	1.12	1.31	1.50
20	.37	.45	.50	.62	.75	.87	1.00	1.25	1.50	1.75	2.00
25	.47	.56	.62	.78	.94	1.09	1.25	1.56	1.87	2.19	2.50
30	.56	.67	.75	.94	1.12	1.31	1.50	1.87	2.25	2.62	3.00
40	.75	.90	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00
50	.94	1.12	1.25	1.56	1.87	2.19	2.50	3.12	3.75	4.37	5.00
60	1.12	1.35	1.50	1.87	2.25	2.62	3.00	3.75	4.50	5.25	6.00
75	1.40	1.69	1.87	2.34	2.81	3.28	3.75	4.69	5.62	6.56	7.50
90	1.68	2.02	2.25	2.81	3.37	3.94	4.50	5.62	6.75	7.87	9.00
100	1.87	2.25	2.50	3.12	3.75	4.37	5.00	6.25	7.50	8.75	10.00
150	2.81	3.37	3.75	4.69	5.62	6.56	7.50	9.37	11.25	13.12	15.00
200	3.75	4.50	5.00	6.25	7.50	8.75	10.00	12.50	15.00	17.50	20.00
300	5.62	6.75	7.50	9.37	11.25	13.12	15.00	18.75	22.50	26.25	30.00

SHEET STEEL.

Number of Gauge.	THICKNESS.		WEIGHT.		Number of Gauge.
	Approximate Thickness. Fractions of an Inch.	Aproximate Thickness. Decimal Parts of an Inch.	Weight per Square Foot. Ounces Avoirdupois.	Weight per Square Foot. Pounds Avoirdupois.	
0000000	1-2	.5	320	20.	0000000
000000	15-32	.46875	300	18.75	000000
00000	7-16	.4375	280	17.5	00000
0000	13-32	.40625	260	16.25	0000
000	3-8	.375	240	15.	000
00	11-32	.34375	220	13.75	00
0	5-16	.3125	200	12.5	0
1	9-32	.28125	180	11.25	1
2	17-64	.265625	170	10.625	2
3	1-4	.25	160	10.	3
4	15-64	.234375	150	9.375	4
5	7-32	.21875	140	8.75	5
6	13-64	.203125	130	8.125	6
7	3-16	.1875	120	7.5	7
8	11-64	.171875	110	6.875	8
9	5-32	.15625	100	6.25	9
10	9-64	.140625	90	5.625	10
11	1-8	.125	80	5.	11
12	7-64	.109375	70	4.375	12
13	3-32	.09375	60	3.75	13
14	5-64	.078125	50	3.125	14
15	9-128	.0703125	45	2.1825	15
16	1-16	.0625	40	2.5	16
17	9-160	.05625	36	2.25	17
18	1-20	.05	32	2.	18
19	7-160	.04375	28	1.75	19
20	3-80	.0375	24	1.5	20
21	11-320	.034375	22	1.375	21
22	1-32	.03125	20	1.25	22
23	9-320	.028125	18	1.125	23
24	1-40	.025	16	1.	24
25	7-320	.021875	14	.875	25
26	3-160	.01875	12	.75	26
27	11-640	.0171875	11	.6875	27
28	1-64	.015625	10	.625	28
29	9-640	.0140625	9	.5625	29
30	1-80	.0125	8	.5	30

WEIGHT OF ROUND IRON.

PER LINEAL FOOT.

Inches.	Pounds.	Inches.	Pounds.	Inches.	Pounds.
3/16	.0930	1 5/16	4.557	4 1/2	53.57
7/32	.1266	1 3/8	5.001	4 3/4	59.69
1/4	.1653	1 7/16	5.466	5	66.13
9/32	.2093	1 1/2	5.952	5 1/4	72.91
5/16	.2583	1 9/16	6.458	5 1/2	80.02
11/32	.3126	1 5/8	6.985	5 3/4	87.46
3/8	.3720	1 3/4	8.101	6	95.23
13/32	.4365	1 7/8	9.300	6 1/4	103.3
7/16	.5063	2	10.58	6 1/2	111.8
1/2	.6613	2 1/8	11.95	6 3/4	120.5
9/16	.8370	2 1/4	13.39	7	129.6
5/8	1.033	2 3/8	14.92	7 1/4	139.0
11/16	1.250	2 1/2	16.53	7 1/2	148.8
3/4	1.488	2 5/8	18.23	8	169.3
13/16	1.746	2 3/4	20.01	8 1/2	191.1
7/8	2.025	2 7/8	21.87	9	214.3
15/16	2.325	3	23.81	9 1/2	238.7
1	2.645	3 1/4	27.94	10	264.5
1 1/16	2.986	3 1/2	32 41	10 1/2	291.6
1 1/8	3.348	3 3/4	37.20	11	320.1
1 3/16	3.730	4	42.33	11 1/2	349.8
1 1/4	4.133	4 1/4	47.78	12	380.9

WEIGHT OF SQUARE IRON.

PER LINEAL FOOT.

Inches.	Pounds.	Inches.	Pounds.	Inches.	Pounds.
3/16	.1184	1 5/16	5.802	4 1/2	68.20
7/32	.1612	1 3/8	6.368	4 3/4	75.99
1/4	.2105	1 7/16	6.960	5	84.20
9/32	.2665	1 1/2	7 578	5 1/4	92.83
5/16	.3290	1 9/16	8.223	5 1/2	101.9
11/32	.3980	1 5/8	8.893	5 3/4	111.4
3/8	.4736	1 3/4	10.31	6	121.3
13/32	.5558	1 7/8	11.84	6 1/4	131.6
7/16	.6446	2	13.47	6 1/2	142 3
1/2	.8420	2 1/8	15.21	6 3/4	153.5
9/16	1.066	2 1/4	17.05	7	165.0
5/8	1.316	2 3/8	19.00	7 1/4	177.0
11/16	1.592	2 1/2	21 05	7 1/2	189.5
3/4	1.895	2 5/8	23.21	8	215.6
13/16	2.223	2 3/4	25.47	8 1/2	243.4
7/8	2.579	2 7/8	27.84	9	272.8
15/16	2.960	3	30.31	9 1/2	304.0
1	3.368	3 1/4	35.57	10	336.8
1 1/16	3.803	3 1/2	41 26	10 1/2	371.3
1 1/8	4.263	3 3/4	47.37	11	407.5
1 3/16	4.750	4	53.89	11 1/2	445.4
1 1/4	5.263	4 1/4	60.84	12	485.0

WEIGHT OF FLAT BAR IRON.

POUNDS.

Width. Inches.	THICKNESS, INCHES.											
	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
1/2	.11	.21	.31	.42	.52	.63	.73	.84	.....	.....	.....	.....
5/8	.13	.26	.40	.53	.66	.79	.92	1.06	1.32	.....	.....	.....
3/4	.16	.32	.47	.63	.79	.95	1.11	1.26	1.58	1.89	.....	.....
7/8	.18	.37	.55	.74	.92	1.11	1.29	1.48	1.85	2.22	2.58	.....
1	.21	.42	.63	.84	1.05	1.26	1.47	1.68	2.11	2.53	2.95	3.37
1 1/8	.24	.47	.71	.95	1.18	1.42	1.66	1.90	2.37	2.84	3.32	3.79
1 1/4	.26	.53	.79	1.05	1.32	1.58	1.84	2.11	2.63	3.16	3.68	4.21
1 3/8	.29	.58	.87	1.16	1.45	1.74	2.03	2.32	2.89	3.47	4.05	4.63
1 1/2	.32	.63	.95	1.26	1.58	1.90	2.21	2.53	3.16	3.79	4.42	5.05
1 5/8	.34	.68	1.03	1.37	1.71	2.05	2.39	2.74	3.42	4.11	4.79	5.47
1 3/4	.37	.74	1.11	1.47	1.84	2.21	2.58	2.95	3.68	4.42	5.16	5.89
1 7/8	.40	.79	1.18	1.58	1.97	2.37	2.76	3.16	3.95	4.74	5.53	6.32
2	.42	.84	1.26	1.68	2.11	2.53	2.95	3.37	4.21	5.05	5.89	6.74
2 1/8	.45	.90	1.34	1.79	2.24	2.68	3.13	3.58	4.47	5.37	6.26	7.16
2 1/4	.47	.95	1.42	1.90	2.37	2.84	3.32	3.79	4.74	5.68	6.83	7.58
2 3/8	.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	5.00	6.00	7.00	8.00
2 1/2	.53	1.05	1.58	2.11	2.63	3.16	3.68	4.21	5.26	6.32	7.37	8.42
2 5/8	.55	1.11	1.66	2.21	2.76	3.32	3.87	4.42	5.53	6.63	7.74	8.84
2 3/4	.58	1.16	1.74	2.32	2.89	3.47	4.05	4.63	5.79	6.95	8.10	9.26
2 7/8	.61	1.21	1.82	2.42	3.03	3.63	4.24	4.84	6.05	7.26	8.47	9.68
3	.63	1.26	1.90	2.53	3.16	3.79	4.42	5.05	6.32	7.59	8.84	10.10
3 1/4	.68	1.37	2.05	2.74	3.42	4.11	4.79	5.47	6.84	8.21	9.58	10.95
3 1/2	.74	1.47	2.21	2.95	3.68	4.42	5.16	5.89	7.37	8.84	10.32	11.79
3 3/4	.79	1.58	2.37	3 16	3.95	4.74	5.53	6.32	7.89	9.47	11.05	12.63
4	.84	1.68	2.53	3.37	4.21	5.05	5.89	6.74	8.42	10.10	11.79	13.47
4 1/4	.90	1.79	2.68	3.58	4.47	5.37	6.26	7.16	8.95	10.74	12.53	14.31
4 1/2	.95	1.90	2.84	3.79	4.74	5.68	6.63	7.58	9.47	11.38	13.26	15.16
4 3/4	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	10.00	12.00	14.00	16.00
5	1.05	2.11	3.16	4.21	5.26	6.32	7.37	8.42	10.53	12.63	14.74	16.84
5 1/4	1.11	2.21	3.32	4.42	5.53	6.63	7.74	8.84	11.05	13.26	15.47	17.68
5 1/2	1.16	2.32	3.47	4.63	5.79	6.95	8.10	9.26	11.58	13.89	16.21	18.52
5 3/4	1.21	2.42	3.63	4.84	6.05	7.26	8.47	9.68	12.10	14.53	16.95	19.37
6	1.26	2.53	3.79	5.05	6.32	7.58	8.84	10.10	12.63	15.16	17.68	20.21
6 1/4	1.30	2.60	3.91	5.20	6.50	7.81	9.11	10.42	13.02	15.62	18.23	20.83
6 1/2	1.35	2.71	4.06	5.42	6.77	8.13	9.48	10.83	13.54	16.25	18.96	21.66
6 3/4	1.41	2.81	4.22	5.63	7.03	8.44	9.84	11.25	14.06	16.87	19.69	22.50
7	1.46	2.92	4.37	5.83	7.29	8.75	10.20	11.66	14.58	17.50	20.42	23.33
7 1/4	1.50	3.02	4.53	6.04	7.56	9.07	10.58	12.08	15.11	18.13	21.16	24.16
7 1/2	1.56	3.13	4.69	6.25	7.81	9.37	10.93	12.50	15.62	18.74	21.86	25.00
7 3/4	1.62	3.23	4.85	6.46	8.08	9.69	11.31	12.92	16.15	19.38	22.62	25.83
8	1.67	3.33	5.00	6.69	8.33	10.00	11.66	13.33	16.66	20.00	23.33	26.66
8 1/4	1.72	3.44	5.16	6 88	8.60	10.31	12.03	13.75	17.19	20.61	24.06	27.50
8 1/2	1.77	3.54	5.31	7.08	8 86	10.63	12.40	14.17	17.71	21.26	24.80	28.33
8 3/4	1.82	3 65	5.47	7.29	9.12	10.94	12.76	14.58	18.23	21.88	25.52	29.17
9	1.88	3.75	5.63	7.50	9.38	11.25	13.12	15.00	18.75	22.50	26.24	30.00
9 1/2	1.98	3.96	5.94	7.92	9.90	11.87	13.85	15.84	19.79	23.74	27.70	31.69
10	2 08	4.17	6.25	8.33	10.41	12.50	14.58	16.66	20.82	25.00	29.16	33.33
10 1/2	2.19	4.38	6.56	8.75	10.94	13.13	15.31	17.50	21.88	26.26	30.62	35.00
11	2.29	4.58	6.87	9.17	11.46	13.75	16.04	18.33	22.90	27.50	32.08	36.66
11 1/2	2.40	4.79	7.19	9 58	11.97	14.37	16.76	19.16	23.94	28.74	33.52	38.33
12	2.50	5.00	7.50	10.00	12.50	15.00	17.50	20.00	25.00	30.00	35.00	40.00

WEIGHT OF CIRCULAR BOILER HEADS.

Diameter. Inches.	THICKNESS OF IRON, INCHES.						
	3/16	1/4	5/16	3/8	7/16	1/2	9/16
24	24	32	40	47	55	64	71
26	28	37	46	56	64	75	84
28	32	43	53	65	75	86	97
30	37	50	62	74	87	100	112
32	42	56	70	84	99	112	127
34	48	64	79	96	111	128	143
36	54	71	89	108	125	142	161
38	60	79	99	120	139	158	179
40	66	88	110	132	154	176	198
42	73	97	121	146	170	194	220
44	80	107	133	160	187	214	240
46	88	117	145	176	204	234	262
48	95	127	158	190	222	254	286
50	103	138	172	206	241	276	310
52	112	149	186	224	260	298	335
54	121	160	200	242	281	320	362
56	130	172	214	260	302	344	389
58	139	185	231	278	324	370	417
60	149	198	247	298	346	396	446
64	...	223	279	335	391	447	503
66	...	237	297	355	414	472	533
68	...	252	319	378	441	504	574
70	...	268	334	401	462	535	601

DIMENSIONS AND WEIGHTS OF SMOKE STACKS.

Boilers.	Size of Stack. Inches.	Gauge of Iron.	Number of Courses.	Size of Base. Inches.	Weight of Stack. Pounds.	Each Additional Foot. Pounds.
10 H. P. Loco.	10 x 15	18	6	14½ x 8¾	95	6
15 H. P. Loco.	12 x 15	18	6	16½ x 8¾	109	7
20 H. P. Loco.	12 x 20	18	8	20½ x 11⅞	140	7
25 H. P. Loco.	14 x 25	18	10	20½ x 11⅞	210	8
30 H. P. Loco.	18 x 35	16	14	26½ x 11⅞	470	13
40 H. P. Loco.	20 x 40	16	16	32½ x 11⅞	600	15
34 Inch Tubular	18 x 30	16	12	20½ x 11⅞	400	13
36 Inch x 10 Ft.	18 x 30	16	12	20½ x 11⅞	400	13
36 Inch x 12 Ft.	18 x 35	16	14	20½ x 11⅞	465	13
40 Inch Tubular	20 x 35	16	14	26½ x 11⅞	525	15
42 Inch Tubular	22 x 40	16	16	32½ x 11⅞	650	16
44 Inch Tubular	22 x 40	16	16	32½ x 11⅞	650	16
46 Inch Tubular	22 x 40	16	16	32½ x 11⅞	650	16
48 Inch Tubular	24 x 40	16	16	42½ x 11⅞	720	18
50 Inch Tubular	24 x 40	16	16	42½ x 11⅞	720	18
52 Inch Tubular	26 x 40	14	16	45½ x 11½	1000	25
54 Inch Tubular	26 x 40	14	16	45½ x 11½	1000	25
60 Inch x 14 & 16 Ft.	30 x 40	14	16	55½ x 11½	1145	28
66 Inch Tubular	36 x 40	12	16	60½ x 11½	1800	44
72 Inch Tubular	40 x 40	12	16	66½ x 11½	1987	49

WEIGHT OF MACHINE BOLTS PER 100.

POUNDS.

LENGTH. Inches.	DIAMETER, INCHES.								
	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
1½	3.37	6.	9.68	13.81	17.62	33.87	.....	.....	.....
1¾	3.81	6.50	10.43	14.68	21.25	35.81	.....	.....	.....
2	4.12	7.	11.18	15.68	22.43	38.25	59.31	.....	.....
2¼	4.38	7.50	11.68	16.68	23.87	40.25	61.87	.....	.....
2½	4.85	8.	12.25	17.68	25.37	42.25	65.	94.	.....
2¾	5.30	8.50	13.68	18.68	26.50	44.25	68.12	98.4	.....
3	5.80	9.	14.06	19.68	27.80	46.25	70.62	101.25	.....
3½	6.30	10.	15.68	21.68	30.40	50.25	76.62	109.75	.....
4	7.25	11.	17.20	23.68	33.	54.25	82.62	117.75	159.37
4½	7.90	12.	18.73	25.68	35.48	58.25	88.62	124.75	170.
5	8.80	13.	20.26	27.68	38.08	62.25	94.62	132.25	179.37
5½	9.70	14.	21.70	29.68	40.68	66.25	100.62	139.37	191.25
6	10.60	15.	23.20	31.68	43.28	70.25	106.62	148.75	202.18
6½	....	....	24.73	33.68	45.88	74.25	112.62	156.87	213.
7	....	....	26.26	35.68	48.48	78.25	118.62	165.	222.25
7½	....	....	27.80	37.68	50.08	82.25	124.62	173.12	233.
8	....	....	29.32	39.68	52.68	86.25	130.62	182.68	244.16
9	....	....	.....	43.68	57.88	94.25	142.92	197.50	260.37
10	....	....	.....	47.68	63.08	102.25	155.22	211.87	286.75
11	....	....	.....	51.68	68.28	110.25	167.52	231.25	304.50
12	....	....	.....	55.68	73.88	118.25	179.82	246.25	321.
13	....	....	.....	.....	79.48	126.25	192.12	259.	350.
14	....	....	.....	.....	85.08	134.25	204.42	270.25	366.25
15	...	....	.....	.....	90.68	142.25	216.72	283.	383.16
16	....	....	.....	.....	96.28	150.25	229.02	308.75	423.75
17	....	....	.....	.....	101.88	158.25	241.32	324.37	442.87
18	....	....	.	.....	107.48	166.25	253.62	343.75	459.62
19	....	....	.....	.....	113.08	174.20	265.92	360.	478.
20	....	....	.....	.	118.68	182.25	278.22	370.	498.25

WEIGHT OF CARRIAGE BOLTS PER 100.

POUNDS.

LENGTH. Inches.	DIAMETER, INCHES.						
	3/16	1/4	5/16	3/8	7/16	1/2	5/8
1½	2.	3.7	6.2	9.7	13.5	20.2	...
2	2.4	4.2	7.2	11.2	15.5	23.2	38.
2½	2.7	4.9	8.2	12.7	17.5	25.5	42.
3	3.1	5.6	9.2	14.5	19.5	27.7	46.
3½	3.5	6.2	10.2	16.	21.5	30.2	50.
4	3.9	7.	11.2	17.5	23.5	32.8	54.5
4½	....	7.7	12.3	19.	25.5	35.5	59.
5	....	8.5	13.5	20.5	27.5	38.5	63.
5½	....	9.2	14.7	22.	29.5	41.1	67.
6	....	9.9	16.	23 5	31.6	43.7	71.
6½	....	10.5	17.1	25.	33.7	46.	75.
7	....	11.1	18.2	26.7	35.8	48.2	80.
7½	....	11.7	19.2	28.5	38.	50.5	85.
8	....	12.5	20.2	30.5	40.	53.	90.
9	....	....	....	33 5	44.	58.7	98.
10	....	....	....	36.7	48.	64.	106.
11	....	....	....	....	....	70.	114.
12	....	....	....	....	....	76.	122.
13	....	....	....	....	....	82.	130.
14	....	....	....	....	....	88.	138.
15	....	....	....	....	....	93.	146.
16	....	....	....	....	....	98.	154.
18	....	....	....	....	....	110.	170.
20	....	....	....	....	....	121.	188.

WEIGHT OF COACH SCREWS PER 100.

POUNDS.

Length. Inches.	DIAMETER, INCHES.								
	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
1½	4.75	7.10	9.88	13.90	....	.....	.....	....	....
1¾	5.25	7.60	10.87	14.95	....	.....	.....	....	....
2	5.75	8.10	11.63	15.80	24	26.25	.....	....	....
2¼	6.25	8.70	12.50	16.90	25	27.75	.....	....	....
2½	6.75	9.35	13.40	17.90	26	29.25	46.50	....	....
3	7.75	10.65	15.10	19.87	28	33.50	51.50	73	....
3½	8.75	11.95	16.50	22.	31	36.50	56.50	79	103
4	9.75	13.30	18.60	24.30	34	39.50	61.50	85	112
4½	10.75	14.70	20.40	26.87	37	42.20	67.	91	120
5	11.75	16.10	22.10	29.	40	46.	72.25	97	130
5½	12.75	17.50	23.80	31.50	43	49.40	78.	103	140
6	13.75	18.90	25.50	34.	46	53.	83.50	110	150
7	.....	.....	29.25	39.	52	60.	94.	125	170
8	.....	.....	33.	44.	58	67.50	104.50	140	190
9	.....	.....	.....	49.	64	75.	115.	156	210
10	.....	.....	.....	54.	70	82.50	126.	172	230
11	.....	.....	.....	.....	76	90.	137.	188	250
12	.....	.....	.....	.....	82	98.	148.	204	270

CONTENTS OF FULL KEGS OF LAG AND COACH SCREWS.

Length. Inches.	DIAMETER, INCHES.			
	3/8	1/2	5/8	3/4
2	3500	1800	...	...
2½	2500	1500	900	...
3	2000	1200	800	...
3½	1800	1000	650	450
4	1500	800	550	400
4½	1200	750	500	350
5	1000	650	450	350
5½	900	600	400	300
6	700	600	400	300
7	....	500	350	250
8	....	450	300	200
9	....	400	250	200

TANK RIVETS.

SOCKET BOLTS. Cone Heads.		NUMBER TO THE POUND.								
		Length.	5/16-Inch Diameter.		1/4-Inch Diameter.		5/16-Inch Diameter.		3/8-Inch Diameter.	
Size. Lgth. Diam.	No. to Keg of 100 Lbs	Inches.	F. & R. H.	Cou. Sun.	F. & R. H.	Cou. Sun.	F. & R. H.	Cou. Sun.	F. & R. H.	Cou. Sun.
12 x 1	37	3/8	165	...	103	...	...	...	...	...
		7/16	...	205	93	...	...	...	...	...
12 x 7/8	45	1/2	140	172	80	108	50	69	31	46
		5/8	125	147	75	94	43	60	28	40
11 x 7/8	48	3/4	103	130	64	75	39	51	23	36
		7/8	91	109	56	68	35	47	21	31
10 x 7/8	41	1	84	101	49	63	32	42	19	28
		1 1/8	77	93	45	56	31	36	18	24
9 x 7/8	56	1 1/4	43	85	42	49	27	34	17	22
		1 3/8	69	...	40	47	25	31	16	21
8 x 7/8	61	1 1/2	63	...	37	42	24	29	15	20
		1 5/8	58	...	35	41	22	27	14	19
7 x 7/8	68	1 3/4	54	...	32	39	21	25	13	18
		1 7/8	50	...	30	35	20	23	12	17
6 x 7/8	79	2	48	...	29	33	19	22	11	16

BOILER RIVETS.

LENGTH. Inches.	NUMBER IN A KEG OF 100 POUNDS.					
	1/2 Inch.	9/16 Inch.	5/8 Inch.	11/16 Inch.	3/4 Inch.	7/8 Inch.
1	990	760	560	450	...	...
1 1/8	875	725	530	415	...	...
1 1/4	800	690	490	389	356	228
1 3/8	760	650	460	370	329	211
1 1/2	730	625	425	357	290	180
1 5/8	710	595	405	340	271	174
1 3/4	690	550	390	325	264	169
1 7/8	665	530	375	312	257	165
2	630	510	360	297	248	156
2 1/8	590	500	354	289	237	152
2 1/4	555	490	347	280	232	149
2 1/2	525	475	335	260	219	141
2 3/4	500	440	312	242	211	133
3	460	410	290	224	203	127
3 1/4	430	380	267	212	190	115
3 1/2	410	350	248	201	180	108
3 3/4	395	335	241	192	162	102
4	...	326	230	184	158	99
4 1/4	...	312	220	177	150	96
4 1/2	...	298	210	171	146	94
4 3/4	...	284	200	166	138	89
5	...	270	190	161	135	87
5 1/4	...	256	180	156	130	84
5 1/2	...	244	172	151	124	80
5 3/4	...	233	164	145	120	77
6	...	223	157	140	115	74
6 1/4	...	213	150	137	111	71
6 1/2	...	207	146	134	107	69
6 3/4	...	203	143	129	104	67
7	...	198	140	125	100	64

CIRCUMFERENCE OF CIRCLES.

Diameter.	Circumference	Diameter.	Circumference	Diameter.	Circumference	Diameter.	Circumference
1/8	.3927	10	31.41	30	94.24	65	204.2
1/4	.7854	10 1/2	32.98	31	97.38	66	207.3
3/8	1.178	11	34.55	32	100.5	67	210.4
1/2	1.570	11 1/2	36.12	33	103.6	68	213.6
5/8	1.963	12	37.69	34	106.8	69	216.7
3/4	2.356	12 1/2	39.27	35	109.9	70	219.9
7/8	2.748	13	40.84	36	113.0	71	223.0
1	3.141	13 1/2	42.41	37	116.2	72	226.1
1 1/8	3.534	14	43.98	38	119.3	73	229.3
1 1/4	3.927	14 1/2	45.55	39	122.5	74	232.4
1 3/8	4.319	15	47.12	40	125.6	75	235.6
1 1/2	4.712	15 1/2	48.69	41	128.8	76	238.7
1 5/8	5.105	16	50.26	42	131.9	77	241.9
1 3/4	5.497	16 1/2	51.83	43	135.0	78	245.0
1 7/8	5.890	17	53.40	44	138.2	79	248.1
2	6.283	17 1/2	54.97	45	141.3	80	251.3
2 1/4	7.068	18	56.54	46	144.5	81	254.4
2 1/2	7.851	18 1/2	58.11	47	147 6	82	257.6
2 3/4	8.639	19	59.69	48	150.7	83	260.7
3	9.424	19 1/2	61.26	49	153.9	84	263.8
3 1/4	10.21	20	62.83	50	157.0	85	267.0
3 1/2	10.99	20 1/2	64.40	51	160.2	86	270.1
3 3/4	11.78	21	65.97	52	163 3	87	273.3
4	12.56	21 1/2	67.54	53	166.5	88	276.4
4 1/2	14.13	22	69.11	54	169.6	89	279.6
5	15.70	22 1/2	70.68	55	172.7	90	282.7
5 1/2	17.27	23	72.25	56	175.9	91	285.8
6	18.84	23 1/2	73.82	57	179.0	92	289.0
6 1/2	20.42	24	75.39	58	182.2	93	292.1
7	21.99	24 1/2	76.96	59	185.3	94	295.3
7 1/2	23.56	25	78.54	60	188.4	95	298.4
8	25.13	26	81.68	61	191.6	96	301.5
8 1/2	26.70	27	84.82	62	194.7	97	304.7
9	28.27	28	87.96	63	197.9	98	307.8
9 1/2	29.84	29	91.10	64	201.0	99	311.0

To compute the circumference of a diameter greater than any in the above table:

RULE.—Divide the dimension by 2, 3, 4, etc., if practicable, until it is reduced to a diameter to to be found in table. Take the tabular circumference of this diameter, multiply it by 2, 3, 4, etc., according as it was divided, and the product will be the circumference required.

Example.—What is the circumference of a diameter of 125? $125 \div 5 = 25$. Tabular circumference of $25 = 78.54$; $78.54 \times 5 = 392.7$, circumference required.

AREA OF CIRCLES.

Diameter.	Area.	Diameter.	Area.	Diameter.	Area.	Diameter.	Area.
1/8	.0123	10	78.54	30	706.86	65	3318.3
1/4	.0491	10 1/2	86.59	31	754.76	66	3421.2
3/8	.1104	11	95.03	32	804.24	67	3525.6
1/2	.1963	11 1/2	103.86	33	855.30	68	3631.6
5/8	.3068	12	113.09	34	907.92	69	3739.2
3/4	.4418	12 1/2	122.71	35	962.11	70	3848 4
7/8	.6013	13	132.73	36	1017.8	71	3959.2
1	.7854	13 1/2	143.13	37	1075 2	72	4071.5
1 1/8	.9940	14	153.93	38	1134.1	73	4185.4
1 1/4	1.227	14 1/2	165.13	39	1194.5	74	4300.8
1 3/8	1.484	15	176.71	40	1256.6	75	4417.8
1 1/2	1.767	15 1/2	188.69	41	1320.2	76	4536.4
1 5/8	2.073	16	201.06	42	1385.4	77	4656.6
1 3/4	2.405	16 1/2	213.82	43	1452.2	78	4778.3
1 7/8	2.761	17	226.98	44	1520.5	79	4901.6
2	3.141	17 1/2	240.52	45	1590.4	80	5026.5
2 1/4	3 976	18	254.46	46	1661.9	81	5153.0
2 1/2	4.908	18 1/2	268.80	47	1734.9	82	5281.0
2 3/4	5 939	19	283.52	48	1809.5	83	5410.6
3	7.068	19 1/2	298.64	49	1885.7	84	5541.7
3 1/4	8.295	20	314.16	50	1963.5	85	5674.5
3 1/2	9.621	20 1/2	330.06	51	2042.8	86	5808.8
3 3/4	11.044	21	346.36	52	2123.7	87	5944.6
4	12.566	21 1/2	363.05	53	2206.1	88	6082.1
4 1/2	15.904	22	380 13	54	2290.2	89	6221.1
5	19.635	22 1/2	397.60	55	2375.8	90	6361.7
5 1/2	23.758	23	415.47	56	2463.0	91	6503.9
6	28.274	23 1/2	433.73	57	2551.7	92	6647.6
6 1/2	33.183	24	452.39	58	2642.0	93	6792.9
7	38.484	24 1/2	471.43	59	2733.9	94	6939.8
7 1/2	44.178	25	490.87	60	2827.4	95	7088.2
8	50.265	26	530.93	61	2922.4	96	7238.2
8 1/2	56.745	27	572.55	62	3019.0	97	7389.8
9	63.617	28	615.75	63	3117.2	98	7542.9
9 1/2	70.882	29	660.52	64	3216.9	99	7697.7

SHOWING AMOUNT OF WATER DISCHARGED PER MINUTE AT DIFFERENT ELEVATIONS

AND POWER REQUIRED TO OPERATE THE PUMP.

Elevation. Feet.	POWER REQUIRED FOR PUMPING, AND GALLONS OF WATER RAISED PER MINUTE.										
	HORSE-POWER.										
	¼	½	¾	1	2	3	4	5	6	7	8
1	625.	1250.	1875.	2500.	5000.	7500.	10000.	12500.	15000.	17500.	20000.
2	312.50	625.	987.5	1250.	2500.	3750.	5000.	6250.	7500.	8750.	10000.
3	208.33	416 66	625.	833.33	1666.66	2500.	3333.33	4166.66	5000.	5833.33	6666.66
4	156.25	312.5	468.75	625.	1250.	1875.	2500.	3125.	3750.	4375.	5000.
5	125.	250.	375.	500.	1000.	1500.	2000.	2500.	3000.	3500.	4000.
6	104.166	208.33	312.5	416.66	833.33	1250.	1666.66	2083.33	2500.	2916.66	3333.33
7	89.28	178.50	267.8	357.1	714.2	1071.428	1428.57	1785.714	2142.857	2500.	2857.143
8	78.125	156.25	234.375	312.5	625.	937.5	1250.	1562.5	1875.	2187.5	2500.
9	69.44	138.875	208.33	277.75	555.5	833.33	1111.11	1388.88	1666.666	1944.44	2222.72
10	62.50	125.	187.5	250.	500.	750.	1000.	1250.	1500.	1750.	2000.
15	41.66	83.33	125.	166.66	333.33	500.	666.666	833.33	1000.	1166.666	1333.33
20	31.25	62.5	93.75	125.	250.	375.	500.	625.	750.	875.	1000.
25	25.	50.	75.	100.	200.	300.	400.	500.	600.	700.	800.
30	20.8	41.66	62.5	83.33	166.666	250.	333.33	416.666	500.	583.33	666.666
35	17.8	35.7	53.5	71.4	142.8	214.25	285.714	357.143	428.57	500.	571.43
40	15.625	31.25	46.875	62.5	125.	187.5	250.	312.5	375.	437.5	500.
45	13.875	27.75	41.66	55.5	111.11	166.666	222.22	277.77	333.33	388.88	444 44
50	12.5	25.	37.5	50.	100.	150.	200.	250.	300.	350.	400.
55	11.33	22.7	34.166	45.4	91.	136.33	181.81	227.273	272.73	318.18	363.64
60	10.4	20.83	31.25	41.66	83.33	125.	166.666	208.33	250.	291.666	333.33
65	9.6	19.23	28.8	38.5	76.875	115.33	153.846	192.308	230.77	269.08	307.7
70	8.9	17.8	26.75	35.6	71.428	107.125	142.857	178.57	214.285	250.	285.7
75	8.33	16.66	25.	33.33	66.666	100.	133.33	166.666	200.	233.33	266.666
80	7.8	15.625	23.4	31.25	62.5	93.75	125.	156.25	187.5	218.75	250.
85	7.33	14.7	22.	29.4	58.8	88.2	117.647	147.06	176.47	205.88	235.29
90	6.9	13.875	20.8	27.75	55.565	83.33	111.11	138.88	166.666	194.44	222.22
95	6.5	13.166	19.6	26.33	52.625	78.9	105.263	131.579	157.89	184.44	210.53
100	6.25	12.5	18.75	25.	50.	75.	100.	125.	150.	175.	200.
150	4.16	8.33	12.5	16.666	33.33	50.	66.666	83.33	100.	116.666	133.33
200	3.125	6.25	9.375	12.5	25.	37.5	50.	66.5	75.	87.5	100.
250	2.5	5.	7.5	10.	20.	30.	40.	50.	60.	70.	80.
300	2.083	4.166	6.25	8.33	16.666	25.	33 33	41.666	50.	58.33	66.666
350	1.75	3.5	5.3	7.	14.25	21.428	28.57	35.714	42.86	50.	57.143
400	1.5	3.125	4.6	6.25	12.5	18.75	25.	31.25	37.5	43.75	50.
450	1.33	2.75	4.1	5.5	11.11	16.666	22.22	27.77	33.33	38.88	44.44
500	1.25	2.5	3.75	5.	10.	15.	20.	25.	30.	35.	40.
600	1.04	2.083	3.125	4.166	8.33	12.5	16.666	20.83	25.	29.666	33.33
700	.875	1.75	2.6	3.5	7.142	10.7	14.286	17.857	21.43	25.	28.57
800	.75	1.5	2.3	3.	6.25	9.375	12.5	15.625	18.75	21.875	25.
900	.66	1.33	2.	2.666	5.5	8.33	11.11	13.88	16.666	19.44	22.22
1000	.625	1.25	1.875	2.5	5.	7.5	10.	22.5	15.	17.5	20.

SHOWING AMOUNT OF WATER DISCHARGED PER MINUTE AT DIFFERENT ELEVATIONS

AND POWER REQUIRED TO OPERATE THE PUMP.—CONTINUED.

Elevation. Feet.	POWER REQUIRED FOR PUMPING, AND GALLONS OF WATER RAISED PER MINUTE. HORSE-POWER.										
	9	10	12	13	14	15	16	17	18	19	20
1	22500.	25000.	30000.	32500.	35000.	37500.	40000.	42500.	45000.	47500.	50000.
2	11250.	12500.	15000.	16250.	17500.	18750.	20000.	21250.	22500.	23750.	25000.
3	7500.	8333.33	10000.	10833.33	11666.66	12500.	13333.33	14166.66	15000.	15833.33	16666.66
4	5625.	6250.	7500.	7000.	8750.	9375.	10000.	10625.	11250.	11875.	12500.
5	4500.	5000.	6000.	6500.	7000.	7500.	8000.	8500.	9000.	9500.	10000.
6	3750.	4166.66	5000.	5416.66	5833.33	6250.	6666.66	7083.33	7500.	7916.66	8333.33
7	3214.29	3571.43	4285.71	4642.86	5000.	5357.143	5714.28	6071.43	6428.57	6785.71	7142.86
8	2812.5	3125.	3750.	4062.5	4375.	4687.5	5000.	5312.5	5625.	5937.5	6250.
9	2500.	2777.77	3333.33	3611.11	3888.88	4166.666	4444.44	4722.22	5000.	5277.77	5555.55
10	2250.	2500.	3000.	3250.	3500.	3750.	4000.	4250.	4500.	4750.	5000.
15	1500.	1666.666	2000.	2166.66	2333.33	2500.	2666.66	2833.33	3000.	3166.66	3333.33
20	1125.	1250.	1500.	1675.	1750.	1875.	2000.	2125.	2250.	2375.	2500.
25	900.	1000.	1200.	1300.	1400.	1500.	1600.	1700.	1800.	1900.	2000.
30	750.	833.33	1000.	1083.33	1166.66	1250.	1333.33	1416.66	1500.	1583.33	1666.66
35	642.86	714.29	857.143	928.28	1000.	1071.43	1142.86	1214.28	1285.71	1357.14	1428.57
40	562.5	625.	750.	812.5	875.	937.5	1000.	1062.5	1125.	1187.5	1250.
45	500.	555.55	666.666	722.22	777.77	833.33	888.88	944.44	1000.	1055.55	1111.11
50	450.	500.	600.	650.	700.	750.	800.	850.	900.	950.	1000.
55	409.1	454.455	545.45	590.91	636.36	681.82	727.27	772.73	818.18	863.64	909.9
60	375.	416.666	500.	541.66	583.33	625.	666.66	708.33	750.	791.66	833.33
65	346.15	384.62	461.54	500.	538.46	576.92	615.38	653.85	692.31	730.77	769.23
70	321.43	357.143	428.57	464.28	500.	535.71	571.43	607.14	642.86	678.57	714.28
75	300.	333.33	400.	433.33	466.66	500.	533.33	566.66	600.	633.33	666.66
80	281.25	312.5	375.	406.25	437.5	468.75	500.	531.25	562.5	593.75	625.
85	264.71	294.12	352.94	382.35	411.76	441.18	470.59	500.	529.41	558.82	588.23
90	250.	277.77	333.33	361.11	388.88	416.666	444.44	472.22	500.	527.77	555.55
95	236.84	263.16	315.79	342.1	368.42	394.74	421.05	447.36	473.68	500.	526.31
100	225.	250.	300.	325.	350.	375.	400.	425.	450.	475.	500.
150	150.	166.666	200.	216.66	233.33	250.	266.66	283.33	300.	316.66	333.33
200	112.5	125.	150.	162.5	175.	187.5	200.	212.5	225.	237.5	250.
250	90.	100.	120.	130.	140.	150.	160.	170.	180.	190.	200.
300	75.	83.33	100.	108.33	116.66	125.	133.33	141.66	150.	158.33	166.66
350	64.29	71.43	85.71	92.86	100.	107.143	114.28	121.43	128.57	135.71	142.86
400	56.25	62.5	75.	81.25	87.5	93.75	100.	106.25	112.5	118.75	125.
450	50.	55.55	66.666	72.22	77.77	83.33	88.88	94.44	100.	105.55	111.11
500	45.	50.	60.	65.	70.	75.	80.	85.	90.	95.	100.
600	37.5	41.666	50.	54.16	58.33	62.5	66.66	70.83	75.	79.16	83.33
700	32.143	35.71	42.86	46.43	50.	53.57	57.14	60.71	64.285	67.86	71.43
800	28.125	31.25	37.5	40.62	43.75	46.875	50.	53.12	56.25	59.37	62.5
900	25.	27.77	33.33	36.11	38.88	41.666	44.44	47.22	50.	52.77	55.55
1000	22.5	25.	30.	32.5	35.	37.5	40.	42.5	45.	47.5	50.

The above table may be used to advantage where the horse-power is given, and it is required to know the amount of water per minute the pump will force to a certain height; also, where the height the water is to be raised and the amount of water needed per minute are known, the required horse-power may be ascertained approximately by referring to the elevation (as given in table), and then to the number of gallons nearest the number required, and the horse-power at the top of the column containing this number will be the approximate horse-power required to pump the water.

DIAMETER AND HORSE-POWER OF SHAFTING.

Diameter of Shaft.	REVOLUTIONS PER MINUTE.															
	1	50	75	100	110	120	130	150	175	200	225	250	300	400	500	1000
1	.0099	.495	.742	.990	1.039	1.118	1 287	1.485	1.732	1.980	2 229	2.475	2.970	3.960	4.990	9 9
1¼	.0175	.875	13.125	1.75	1.925	2.10	2.275	2.625	3.062	3.5	3.937	4.375	5.25	7.	8.75	17.5
1½	.03	1.50	2.25	3.00	3.30	3.60	3.90	4.50	5.25	6.00	6.75	7.5	9.	12.	15.	30.
1¾	.045	2.25	3.375	4.5	4.95	5 4	5 85	6 75	7 875	9.00	10.125	11.25	13.5	18.	22.5	45.
2	.07	3.5	5 15	7.	7.7	8 4	9.1	10.5	12.5	14.0	15.75	17.5	21.	28.	35.	70.
2¼	.1	5.	7.5	10.	11.	12	13.	15.	17 5	20.	22.5	25.	30	40.	50.	100.
2½	.130	6.5	9.75	13.	14.3	15.6	16.9	19.5	22 75	26 0	29 25	32.5	39.	52.	65.	130.
2¾	.165	7.5	11 25	15.	16.5	18.	19.5	22.5	26 25	30.	33.75	37.5	45.	60.	75.	150.
3	.225	11.25	16 875	22 5	24.75	27.	29.25	33.75	39.375	45.	50.6	56.2	67.5	90.	112.5	225.
3¼	.275	13.75	21.62	27.5	30.25	32.	34.75	41.25	47 75	55.	61.875	68.75	82.5	110.	137 5	275.
3½	.33	16.5	24 75	33.	36.3	40.20	42.9	49.5	57.75	66.	74.25	82.5	99	132	165.	330.
3¾	.412	20 6	30.9	41.2	45.32	49.44	53.56	61.8	71 10	82.4	92.7	103.	123 6	164.3	206.	412.
4	.5	25.	37.5	50.	55.	60.	65.	75.	87 5	100.	112.5	125.	150.	200.	250.	500.
4¼	.6	30.	45 6	60.	66.	72.	78.	90.	105.	120.	135.	150.	180	240.	300.	600.
4½	.725	35.25	54.27	72.5	79.75	86.	94.25	108.70	126 87	145.	163.	180.	217.	280.	350.	725.
4¾	.85	42.5	63 75	85.	93.5	102.	110.	127.	143.	170.	191.	212.	255.	340.	425.	850.
5	1.	50.	75.	100.	110.	120.	130.	150.	175.	200.	225.	250.	300.	400.	500.	1000.
5½	1.325	66.	99.	132.	145.	159.	172.	198	232	265.	298.	331.	397.	530.	662.	1524.
6	1.725	86.	139.	172.	189.	207.	224.	258.	301.	345.	388.	431.	517.	690.	862.	1724.
6½	2.175	108.	163.	217	239.	261.	282.	326.	380.	435.	489.	543.	652.	870.	1087	2174.
7	2.7	135	202.	270.	297.	324	351.	405.	472.	540.	607.	673.	810.	1080.	1350.	2700.

This table is calculated for general shafting, transmitting power by belt pulleys. For shafting carrying heavy weights or transmitting power by gears, diameter should be increased accordingly.

RELATIVE THICKNESS OF SOFT AND COLD ROLLED SHEET COPPER,

ACCORDING TO WEIGHTS OF BRAZIER SHEETS.

Pounds to Sheet. 30 x 60 Inches.	Ounces Per Square Foot.	Thickness. Decimal Inches.	B. & S.	B. W. G.	Fractional Inches. Approximate.
5	6	.009	31	32	..
10	14	.017	25	26	..
15	20	.032	20	21	1/32
20	25	.035	19	20	..
25	32	.045	17	18	3/64
30	38	.054	15	17	..
35	44	.060	14	16	1/16
40	51	.072	13	15	..
45	57	.080	12	14	5/64
50	64	.090	11	13	3/32
60	76	.101	10	12	7/64
70	89	.125	8	11	1/8
80	102	.144	7	9	9/64
90	115	.162	6	8	11/64
100	128	.181	5	7	3/16
110	140	.190	4	6	13/64
120	155	.207	3	5	7/32

ROLLED COPPER

HAS A SPECIFIC GRAVITY OF 8.93.

One cubic foot weighs..... $558\frac{125}{1000}$ pounds.
One square foot, one inch thick, weighs,..... $46\frac{51}{100}$ pounds.

CAPACITY OF CISTERNS IN GALLONS FOR EACH 10 INCHES IN DEPTH.

Diameter. Feet.	Gallons.	Diameter. Feet.	Gallons.	Diameter. Feet.	Gallons.
2	19.5	6½	206 85	12	705.
2½	30.5	7	239.88	13	827.4
3	44 6	7½	275.4	14	959.6
3½	59.97	8	313 33	15	1101.6
4	78.33	8½	353.72	20	1958.4
4½	99.14	9	396.56	25	3059.9
5	122.4	9½	461.4	30	4406 4
5½	148.1	10	489.6	35	5990.
6	176.25	11	592.4	40	7831.

One cubic foot contains contains 7.480519 gallons U. S. One gallon contains 231 cubic inches.

EXPLANATION OF MINER'S INCH.

The term "Miner's Inch" is of California origin, it being a method of measurement adopted by the various ditch companies in disposing of water to their customers. The term is more or less indefinite, for the reason that the water companies do not all use the same head above the center of the aperture, and the inch varies from 1.36 to 1.73 cubic feet per minute each, but the most common measurement is through an aperture 2 inches high and whatever length is required, and through a plank 1¼ inches thick. The lower edge of the aperture should be 2 inches above the bottom of the measuring box, and the plank 5 inches high above the aperture, thus making a 6-inch head above the center of the stream. Each square inch of this opening represents a Miner's Inch, which is equal to a flow of 1½ cubic feet per minute. Time is not to be considered in any calculation based upon a miner's inch measurement.

USEFUL INFORMATION.

Capacity of Pipes.—Doubling the diameter of a pipe increases its capacity four times. Friction of liquids in pipes increases as the square of the velocity.

Atmospheric Pressure.—The mean pressure of the atmosphere is usually estimated at 14.7 pounds per square inch, so that with a perfect vacuum it will sustain a column of mercury 29.9 inches; or a column of water 33.9 feet high.

To find the pressure in pounds per square inch of a column of water: Multiply the height of the column in feet by .434. Approximately, we say, that every foot elevation is equal to ½ pound pressure per square inch; this allows for ordinary friction. To find the height of a column of water, multiply the pressure by 2.31.

To find the diameter of a pump cylinder to move a given quantity of water per minute (100 feet of piston being the standard of speed): Divide the number of gallons by 4, then extract the square root, and the product will be the diameter in inches of the pump cylinder.

To find quantity of water elevated in one minute running at 100 feet of piston speed per minute: Square the diameter of the water cylinder in inches and multiply by 4. Example: Capacity of a 5-inch cylinder is desired. The square of the diameter (5 inches) is 25, which multiplied by 4 gives 100, the number of gallons per minute (approximately).

To find the capacity of a cylinder in gallons: Multiplying the area in inches by the length of stroke in inches will give the total number of cubic inches; divide this amount by 231 (which is the cubical contents of a United States gallon in inches) and product is the capacity in gallons.

The capacity per minute will be determined by multiplying this product by number of strokes cylinder is working per minute.

To find the horse-power necessary to elevate water to a given height: Multiply the number of gallons per minute by 8.35 (weight of one gallon), and this result by total number of feet water is raised, (that is, from surface of the water to the highest point to which the water is raised), and you have the power in foot pounds. Divide by 33000 and you have the horse-power. One horse power is equal to about five men. To the theoretical power a liberal allowance for friction, etc., always wants to be added.

It is estimated that it requires approximately one horse power, including friction, to raise sixty gallons of water per minute, thirty-three feet high. It is immaterial whether it is raised with a large or small pump, as the theory is, it requires a given quantity of power to raise a given quantity of water a given height in a given length of time. Of course, if the pump is large it must be worked slowly, and if small it can be worked faster; the power required to work a small pump fast is the same as to work a large pump slow for the same given height and quantity.

To find the area of a required pipe, the volume and velocity of water being given, multiply the number of cubic feet of water by 144, and divide the product by the velocity in feet per minute. The area being found, it is easy to get the diameter of pipe necessary.

To find the velocity in feet per minute necessary to discharge a given volume of water in a given time, multiply the number of cubic feet of water by 144, and divide the product by the area of the pipe in inches.

SUGGESTIONS REGARDING CORRESPONDENCE ABOUT PUMPS.

In ordering or inquiring about Pumps, purchasers should inform us upon the following questions:

For what purpose is the pump to be used?

What is the maximum quantity to be pumped per hour?

To what height is the water to be lifted by suction; the length of suction pipe, size and number of turns?

What is the pressure of steam to be used?

Is the water to be pumped hot or cold?

Inquirers about Deep Well Pumps should inform us on the following questions:

Is your well already bored? If so, is it cased, and how? Or, if open well, so state?

What is its depth?

At what height does the water stand in the well, and what is the distance from water to ground level?

How much higher than the surface of the ground do you wish to raise the water?

What is the length of the horizontal pipe from well to tank or reservoir?

What is the greatest quantity, in gallons, of water required per day or hour?

Has your well been tested? If so, how, and what was the result?

Notes on the use of Wire Rope.

Two kinds of wire rope are manufactured. The most pliable variety contains nineteen wires in the strand, and is generally used for hoisting and running rope. The ropes with twelve wires and seven wires in the strand are stiffer, and are better adapted for standing rope, guys and rigging. Orders should state the use of the rope, and advice will be given.

Wire rope is as pliable as new hemp rope of the same strength; the former will therefore run over the same sized sheaves and pulleys as the latter. But the greater the diameter of the sheaves, pulleys or drums, the longer wire rope will last.

Experience has demonstrated that the wear increases with the speed. It is, therefore, better to increase the load than the speed.

Wire rope is manufactured either with a wire or a hemp center. The latter is more pliable than the former, and will wear better where there is short bending. Orders should specify what kind of center is wanted.

Wire rope must not be coiled or uncoiled like hemp rope.

When mounted on a reel, the latter should be mounted on a spindle or flat turn-table to pay off the rope. When forwarded in a small coil without reel, roll it over the ground like a wheel, and run off the rope in that way. All untwisting or kinking must be avoided.

To preserve wire rope apply raw linseed oil with a piece of sheep skin, wool inside; or mix the oil with equal parts of Spanish brown or lamp-black.

To preserve wire rope under water or under ground, take mineral or vegetable tar, and add one bushel of fresh slacked lime to one barrel of tar, which will neutralize the acid. Boil it well, and saturate the rope with the hot tar. To give the mixture body, add some sawdust.

In no case should galvanized rope be used for running rope. One day's use scrapes off the coating of zinc, and rusting proceeds with twice the rapidity.

The grooves of cast iron pulleys and sheaves should be filled with well seasoned blocks of hard-wood, set on end, to be renewed when worn out. This end wood will save wear and increase adhesion. The smaller pulleys or rollers which support the ropes on inclined planes should be constructed on the same plan. When large sheaves run with very great velocity, the grooves should be lined with leather, set on end, or with India rubber. This is done in the case of sheaves used in the transmission of power between distant points by means of rope, which frequently runs at the rate of 4000 feet per minute.

The Area of the Steam Piston, multiplied by the steam pressure, gives the total amount of pressure that can be exerted. *The area of the water piston* multiplied by the pressure of water per square inch gives the resistance. A *margin* must be made between the *power* and the *resistance* to move the pistons at the required speed, say from 20 to 40 per cent., according to speed and other conditions.

Composition of Alloys in every-day use in Brass Foundries.

(American Machinist.)

	Copper. Pounds.	Zinc. Pounds.	Tin. Pounds.	Lead. Pounds.	
Bell Metal	16	..	4	..	Bells for ships and factories.
Brass (yellow)	16	8	..	½	For plumbers, ship and house brass work.
Bush Metal	64	8	4	4	For bearing bushes for shafting.
Gun Metal	32	1	3	..	For pumps and other hydraulic purposes.
Hard Gun Metal	16	..	2½	..	For heavy bearings.
Muntz Metal	60	40	..	..	Metal from which bolts and nuts are forged, valves, spindles, etc.
			Phos. Tin.		
Phosphor Bronze	92	..	8	..	For valves, pumps and general work.
Phosphor Bronze	90	..	10	..	For cog and worm wheels, bushes, axle bearings, slide valves, etc.
Brazing Metal	16	3	..	..	Flanges for copper pipes.
Brazing Solder	50	50	..	..	Solder for the above flanges.

Useful Alloys of Copper, Tin and Zinc.

	Copper.	Tin.	Zinc.	
U. S. Navy Dept. Journal Boxes and Guide Gibs	6	1	¼	parts.
	82.8	13.8	3.4	per cent.
Tobin Bronze	58.22	2.30	39.48	per cent.
Naval Brass	62.	1.	37.	per cent.
Composition, U. S. Navy	88.	10.	2.	per cent.
Brass Bearings (J. Rose)	64	8	1	parts.
	87.7	11.0	1.3	per cent.
Gun Metal	92.5	5.	2.5	per cent.
Gun Metal	91.	7.	2.	per cent.
Gun Metal	87.75	9.75	2.5	per cent.
Gun Metal	85.	5.	10.	per cent.
Gun Metal	83.	2.	15.	per cent.
Tough Brass for Engines	13	2	2	parts.
	76.5	11.8	11.7	per cent.
Bronze for Rod Boxes (Lafond)	82.	16.	2.	slightly malleable.
Bronze for pieces subject to shock	83.	15.	1.50	0.50 lead.
Red Brass, parts	20	1	1	1 lead.
Red Brass, per cent	87.	4.4	4.3	4.3 lead.
Bronze for Pump Casing (Lafond)	88.	10.	2.	
Bronze for Eccentric Straps	84.	14.	2.	
Bronze for Shrill Whistles	80.	18.	....	2.0 antimony.
Bronze for Low-Toned Whistles	81.	17.	....	2.0 antimony.
Art Bronze	97.	2.	1.	
Gold Bronze	89.5	2.1	5.6	2.8 lead.
Bearing Metal	89.	8.	3.	
Bearing Metal	89.	2.5	8.5	
Bearing Metal	86.	14.	....	
Bearing Metal	85.25	12.75	2.	
Bearing Metal	80	18.	2.	
Bearing Metal	79.	18.	2.5	.5 lead.
Bearing Metal	74.	9.5	9.5	7. lead.
English Brass of A. D. 1504	64.	3.	29.5	3.5 lead.

It is not good practice to use the shaft for the purpose of casting the bearings, especially if the shaft be steel, for the reason that the hot metal is apt to spring it; the better plan is to use a mandrel of the same size or a trifle larger for this purpose. For slow running journals, where the load is moderate, almost any metal that may be conveniently melted and will run free will answer the purpose. For wearing properties, with a moderate speed, there is probably nothing superior to pure zinc, but when not combined with some other metal it shrinks so much in cooling that it cannot be held firmly in the recess, and soon works loose; and it lacks those anti-friction properties which are necessary in order to stand high speed.

For line shafting, and all work where the speed is not over 300 or 400 revolutions per minute, an alloy of 8 parts zinc and 2 parts block tin will not only wear longer than any composition of this class, but will successfully resist the force of a heavy load. The tin counteracts the shrinkage, so that the metal, if not overheated, will firmly adhere to the box until it is worn out. But this mixture does not possess sufficient anti-friction properties to warrant its use in fast running journals.

Among all the soft metals in use there are none that possess greater anti-friction properties than pure lead; but lead alone is impracticable, for it is so soft that it cannot be retained in the recess. But when by any process lead can be sufficiently hardened to be retained in the boxes without materially injuring its anti-friction properties, there is no metal that will wear longer in light fast-running journals. With most of the best and most popular anti-friction metals in use and sold under the name of the Babbitt metal, the basis is lead.

Lead and antimony have the property of combining with each other in all proportions without impairing the anti-friction properties of either. The antimony hardens the lead, and when mixed in the proportion of 80 parts lead by weight with 20 parts antimony, no other known composition of metals possesses greater anti-friction or wearing properties, or will stand a higher speed without heat or abrasion. It runs free in its melted state, has no shrinkage, and is better adapted to light, high speeded machinery than any other known metal. Care, however, should be manifested in using it, and it should never be heated beyond a temperature that will scorch a dry pine stick.

Many different compositions are sold under the name of Babbitt metal. Some are good, but more are worthless, while but very little genuine Babbitt metal is sold that is made strictly according to the original formula. Most of the metals sold under that name are the refuse of type foundries and other smelting works, melted and cast into fancy ingots with special brands, and sold under the name of Babbitt metal.

Solder.—Common solders, equal parts tin and lead; fine solder, 2 tin to 1 lead; cheap solder, 2 lead to 1 tin.

Proportions of Cement for Cast Iron.

In mixing cement for cast iron, put one ounce of sal-ammoniac to each hundred weight of borings, and use it without allowing it to heat. Multiply the length of any joint in feet by the breath in inches, by the thickness in eighths, and by .3; the products will be the weight of dry borings, in pounds avoirdupois, required to make cement to fill that joint, nearly.

Or, take of sal-ammoniac, 2 ounces; flour of sulphur, 1 ounce; clean cast iron borings or filings, 16 ounces; mix them well in mortar and keep them dry. When required for use, take one part of this powder, and twenty parts of clean iron borings or filings, mix thoroughly in a morter, make the mixture into a stiff paste with a little water, and apply it between the the joints and screw them together. A little fine grindstone sand added improves the cement.

A mixture of white paint and red lead spread on canvas or woolen, and placed between the joints, is best adapted for joints that require to be often separated.

Above the Freezing Point.—Any number of degrees of Fahrenheit minus 32, multiplied by 5 and divided by 9=Centigrade.

Below the Freezing Point.—Any number of degrees of Fahrenheit plus 32, multiplied by 5 and divided by 9=Centigrade.

Sizes of Steam Pipes for Stationary Engines.

Authorities on the steam engine generally agree that steam pipes supplying engines should be of such size that the mean velocity of steam in them does not exceed 6000 feet per minute, in order that the loss of pressure due to friction may not be excessive. The velocity is calculated on the assumption that the cylinder is filled at each stroke. In very long pipes, 100 feet and upward, it is well to make them larger than this rule would give, and to place a large steam receiver on the pipe near the engine, especially when the engine cuts off early in the stroke.

Diameter of Pipe, inches.....	2	2½	3	3½	4	4½	5	6	7	8	9	10
Average Horse-Power of Engines.....	25	39	56	77	100	126	156	225	306	400	506	625

To Calculate the Effect of a Lever and Weight Upon the Safety Valve of a Steam Boiler, Etc.

The lever, in all cases, is supposed to be made, finished, and balanced, by a known weight or weights, on the short end, making that point where it rests, or is attached to the valve, the centre of motion; then that weight, added to the weight of the lever, is the effective weight upon the valve.

When a certain pressure upon the valve is required, the weight upon the lever and distance of valve from the center of motion given, to find where that weight must be placed:

Rule.—From the required weight upon the valve in pounds, subtract the weight of the valve, plus the effective weight of the lever, multiply the remainder by the distance between the fulcrum and the valve, divide the product by the weight in pounds upon the lever, and the quotient is the distance in inches from the fulcrum that the weight must be placed.

Suppose the weight upon the lever equal 17.625 pounds, it is required at what distance the weight must be placed to equal 80 pounds:

$$\frac{80-9.\ 5x5}{17.625}=20 \text{ inches.}$$

Tubular Boilers.

Each nominal horse-power requires:

8 cubic feet total boiler capacity.

2 cubic feet steam-room.

10 square feet of heating surface—the whole tube surface being taken as effective.

½ square foot of fire-grate surface.

1 cubic foot of water per hour.

10 square inches sectional area of tubes.

13 square inches flue area.

6 square inches chimney area.

Diameter of tubes $\frac{1}{80}$ of their length.

The area for entrance of air to ash-pit should be ¼ the area of grate. 2 feet 6 inches is sufficient depth.

The grate-bars inclining downward 1 inch per foot, not more than ¾ inch thick, and ⅜ to ½ inch spaces between.

The furnace should have 3 cubic feet of space above each superficial foot of grate-bar surface.

Fire Boxes should be constructed according to coal to be burned. Anthracite requires grate to be high. For bituminous coals grate should be low and fire box large—this may be carried to a fire box of 4 or 5 feet in height. The temperature of the boiler sheets being much lower than that of the flame, tends to check combustion. Dense black smoke issuing from smoke stack indicates poorly arranged fire box or a poor fireman, or both.

Coaling cannot be done properly by filling fire box, but coal must be thrown in a little at a time and thoroughly spread over fire.

If troubled with clinker, admit steam jets under grates.

Boiler Scale.—The best thing is kerosene, introduced at first in small quantities and increased until desired quantity is determined. Crude and other oils are detrimental.

Dangerous Steam Boilers.—The Hartford steam boiler inspection in 1893, examined 163,328 boilers; found 122,893 in more or less bad condition and 12,390 dangerous.

Steam Heaters.—Each increase of 11 degrees in feed water temperature makes a saving of about 1 per cent. in fuel.

Strains caused by Cold Feed Water.—From 8,000 to 10,000 pounds per square inch may be produced by cold feed water striking directly upon the plates, and this, in addition to the nominal strain produced by steam pressure, is quite enough to tax the girth seams beyond their elastic limit if the cold feed water pipe discharges anywhere near them.

Steam Separators.—A good separator will deliver steam with only about 1 to 1½ per cent. of moisture.

Table of Proportionate Lengths of Bearings, or Journal for Shafts of Various Diameters.

Diameter. Inches.	Length. Inches.	Diameter. Inches.	Length. Inches.
1	1¾	6½	8¾
1½	2¼	7	9⅜
2	3	7½	10
2¼	3¼	8	10¾
2½	3½	8½	11⅜
3	4¼	9	12
3½	4⅞	9½	12¾
4	5½	10	13¼
4½	6⅛	10½	14
5	6¾	11	14½
5½	7½	11½	15¼
6	8¼	12	16

Rules for Calculating Speed of Pulleys.

Problem I.—The diameter of the driver and driven being given, to find the number of revolutions of the driven:

Rule.—Multiply the diameter of the driver by its number of revolutions, and divide the product by the diameter of the driven; the quotient will be the number of revolutions.

Problem II.—The diameter and the number of revolutions of the driver being given, to find the diameter of the driven, that shall make any given number of revolutions in the same time:

Rule.—Multiply the diameter of the driver by its number of revolutions, and divide the product by the number of revolutions of the driven; the quotient will be its diameter.

Problem III.—To ascertain the size of the driver:

Rule.—Multiply the diameter of the driven by the number of revolutions you wish to make, and divide the product by the revolutions of the driver; the quotient will be the size of the driver.

Belts, like gears, have a pitch-line, or a circumference of uniform motion. This circumference is within the thickness of the belt, and must be considered if pulleys differ greatly in diameter, and a required speed is absolutely necessary.

Notes on Belting.

Don't overtax belts by overloading them or by running them tighter than necessary.

When it is not convenient to measure with the tape line the length required, the following rule will be found of service: *Add the diameter of the two pulleys together, divide the result by 2, and multiply the quotient by 3¼, then add this product to twice the distance between the centres of the shafts, and you have the length required.*

In the location of shafts that are to be connected with each other by belts, care should be taken to secure a proper distance one from the other. It is not easy to give a definite rule as to what this distance should be. Circumstances, generally, have much to do with the arrangement, and the engineer or machinist must use his judgment, making all things conform, as far as may be, to general principles. This distance should be such as to allow of a gentle sag to the belt when in motion.

A general rule may be stated thus:—Where narrow belts are to be run over small pulleys—15 feet is a good average—the belt having a sag of 1½ to 2 inches.

For larger belts, working on larger pulleys, a distance of 20 to 25 feet does well, with a sag of 2½ to 4 inches.

For main belts working on very large pulleys, the distance should be 25 to 30 feet, the belts working well with a sag of 4 to 5 inches.

If too great a distance is attempted, the weight of the belt will produce a very heavy sag, drawing so hard on the shaft as to produce great friction in the bearings, while at the same time the belt will have an unsteady flapping motion, which will destroy both the belt and machinery.

If possible to avoid it, connected shafts should never be placed one directly over the other, as in such case the belt must be kept very tight to do the work. For this purpose, belts should be carefully selected of well-stretched leather.

It is desirable that the angle of the belt with the floor should not exceed 45 degrees. It is also desirable to locate the shafting and machinery so that belts should run off from each shaft in opposite directions, as this arrangement will relieve the bearings from the friction that would result when the belts all pull one way on the shaft.

The diameter of the pulleys should be as large as can be admitted, provided they will not produce a speed of more than 3750 feet of belt motion per minute. Some authorities limit this speed to 3000 feet.

The pulley should be a little wider than the belt required for the work.

The motion of driving should run with and not against the laps of the belts.

Tightening or guide pulleys should be applied to the slack side of belts and near the smaller pulley.

Quick-motion belts should be made as straight and as uniform in section and density as possible, and endless if practicable, that is, with permanent joints.

Belts which run loose will, of course, last much longer than those which must be drawn tightly to drive—tightness being evidence of overwork and disproportion. Never add to the work of a belt so much as to overload it.

The transmitting of power of a double belt is to that of single belt as 10 is to 7. In ordering pulleys the kind of belt to be used should always be specified.

The strongest part of belt leather is near the flesh side, about one-third the way through from that side. It is, therefore, desirable to run the grain (hair) side on the pulley, in order that the strongest part of the belt may be subject to the least wear.

The flesh side is not liable to crack, as the grain side will do when the belt is old, hence it is better to crimp the grain than to stretch it.

Leather belts run with grain side to the pulley will drive 30 per cent. more than if run with flesh side. By the above it is meant that the *smooth* side of a belt should run next the pulley.

A belt adheres much better and is less liable to slip when at a quick speed than a slow speed. Therefore it is better to gear a mill with small pulleys and run them at a high velocity than with large pulleys and to run them slower. A mill thus geared costs less and has a much neater appearance than with large, heavy pulleys.

Belts should be kept clean and free from accumulations of dust and grease, and particularly from contact with lubricating oils, some of which permanently injure leather.

Leather belts must be well protected against water, and even moisture.

Belt Rules.—It is safe and advisable to use a double belt on a pulley 12 inches in diameter, a triple belt on a pulley 20 inches in diameter or larger. As belts increase in width they should also be make thicker. Belts should be fastened together by splicing when possible. Splices should be 10 inches long in belts up to 10 inches wide, and from 10 to 18 inches wide as long as width of belt, 18 inches being greatest length necessary.

Double Belts, when treated with great care and run night and day at slow speed, should last from 7 to 10 years. In punching a belt for lacing use an o al punch, the longer diameter being parallel with the sides of the belt. Punch two rows of holes in each end placed zigzag; the edge of holes should not come nearer edges of belt than ¾ inch and should be at least ⅞ inch from end and second row at least 1¾ inches. On wider belts distances should be a little greater.

Quarter Turn Belts.—Driver pulley must be centrally plumb with drivers as it runs off from pulley.

Endless Belts should never be run onto pulley. Lift out one shaft, place belt on pulley and force shaft back to its place.

Setting Slide Valves.

When the valve is at the middle of its stroke, the faces ought to cover the apertures on the exhausting side about $\frac{1}{10}$ of an inch; the cover on the steam side being for the purpose of cutting off the steam at any part of the stroke, is therefore, at the entire discretionary judgment of the engineer. However, we find from practice, that high-pressure engines with short strokes, as locomotives, etc., require no more than will cover the apertures properly; whereas condensing engines, with steam of 2½ to 3 pounds per square inch, will work well with ⅝ of an inch cover on the steam side; and marine engines give great satisfaction with 1⅜ inches cover, when the steam is 4½ pounds to 5 pounds per square inch.

Again, the lead of the valve (as it is termed among engineers) is a certain distance that the extremity of the eccentric must be in advance of the crank, so that the valve may be open as required when the piston is at the top or botton of the cylinder, for this reason, that, at the return of the stroke, the steam in the cylinder may be of, or nearly, an equal density with the steam in the boiler; consequently, the nearer that the length of the aperture is to the area of the cylinder, the less lead is required.

Valve Lead.—Stationary engines running at slow speed may have a lead of from $\frac{1}{64}$ to $\frac{1}{16}$ inch.

Setting Valves of Engines.—After the valve has been set accurately as possible, when cold, the lead and lap for the forward and return stroke being equalized, indicator diagrams should be taken and the length of the eccentric rod adjusted if necessary to correct slight irregularities.

To put an Engine on its center.—Place the engine in a position where the piston will have nearly completed its outward stroke and opposite some point on the cross head, such as a corner, make

a mark upon the guide. Against the rim of the pulley on crank disk place a pointer and mark a line on the pulley. Then turn the engine over the center until cross head is again in the same position on its inward stroke, this will bring the crank as much below the center as it was above before. With the pointer in the same position as it was before make a second mark on the pulley rim. Divide the distance between the marks in two and mark the middle point. Turn the engine until the pointer is opposite this middle point and it will be on its center.

Shrinkage of Castings.

In locomotive cylinders=$\frac{1}{16}$ inch in a foot.
Pipes=$\frac{1}{8}$ inch in a foot.
Girders, beams, etc.=$\frac{1}{8}$ inch in 15 inches.
Engine beams, connecting rods, etc.=$\frac{1}{8}$ inch in 16 inches.
Large cylinders, say 70 inches in diameter, 10 foot stroke, the contraction of diameter=$\frac{3}{8}$ inch at top.
Ditto=$\frac{1}{2}$ inch at bottom.
Ditto in length=$\frac{1}{8}$ inch in 16 inches.
Thin brass=$\frac{1}{8}$ inch in 9 inches.
Thick brass=$\frac{1}{8}$ inch in 10 inches.
Zinc=$\frac{5}{16}$ inch in a foot.
Lead=$\frac{5}{16}$ inch in a foot.
Copper=$\frac{3}{16}$ inch in a foot.
Bismuth=$\frac{5}{32}$ inch in a foot.
Tin=$\frac{1}{4}$ inch in a foot.

Weight of Casting determined by weight of Pattern.—For each pound of pattern made of—

Red pine, iron casting will weigh	12.5 pounds.
White pine, iron casting will weigh	16.7 pounds.
Yellow pine, iron casting will weigh	14.1 pounds.

To Test Steel and Iron.

Nitric acid will produce a black spot on steel; the darker the spot the harder the steel. Iron, on the contrary, remains bright if touched with nitric acid. Good steel in its soft state has a curved fracture and a uniform gray lustre; in its hard state a dull, silvery, uniform white. Cracks, threads or sparkling particles denote bad quality.

Good steel will not bear a white heat without falling to pieces, and will crumble under the hammer at a *bright* red heat, while at a middling heat it may be drawn out under the hammer to a fine point.

To Test Quality of Iron.

If fracture gives long silky fibres of leaden-gray hue, fibres cohering and twisting together before breaking, may be considered a tough, soft iron. A medium even grain mixed with fibers, a good sign. A short, blackish fibre indicates badly refined iron. A very fine grain denotes a hard, steely iron, apt to be cold-short, hard to work with a file. Coarse grain with brilliant crystallized fracture, yellow or brown spots, denotes a brittle iron, cold short, working easily when heated; welds easily. Cracks on the edge of bars sign of hot short iron. Good iron is readily heated, soft under the hammer and throws out but few sparks.

All iron contains more or less carbon—the hardest the most.

Fluxes for Soldering or Welding.

Iron or Steel	Borax or sal-ammoniac.
Tinned Iron	Resin or chloride of zinc.
Copper and Brass	Sal-ammoniac or chloride of zinc.
Zinc	Chloride of zinc.
Lead	Tallow or resin.
Lead and Tin pipes	Resin and sweet oil.

Brazing.—The edges filed or scraped clean and bright, covered with spelter and powdered borax, and exposed in a clear fire to a heat sufficient to melt the solder.

Note on Forgings.—Iron, while heating, if exposed to air, will *oxidize;* while at white heat, if in contact with coal, will carbonize, or become steely. Iron should be heated as rapidly as possible.

Notes on the Working of Steel.

Extract from a Lecture read before the Engineers' Society of Western Pennsylvania by William Metcalf, C. E.

1. Good soft heat is safe to use if steel be immediately and thoroughly worked. It is a fact that good steel will endure more pounding than any iron.

2. If steel be left long in the fire it will lose its steely nature and grain, and partake of the nature of cast iron. Steel should never be kept hot any longer than is necessary to the work to be done.

3. Steel is entirely mercurial under the action of the heat, and a careful study of the tables will show that there must of necessity be an injurious internal strain created, whenever two or more parts of the same piece are subjected to different temperatures.

4. It follows that when steel has been subjected to heat not absolutely uniform over the whole mass, careful annealing should be resorted to.

5. As the change of volume due to a degree of heat increases directly and rapidly with the quantity of carbon present; therefore high steel is more liable to dangerous internal strains than low steel, and great care should be exercised in the use of high steel.

6. Hot steel should always be put in a perfectly dry place of even temperature while cooling. A wet place in the floor might be sufficient to cause serious injury.

7. Never let anyone fool you with the statement that his steel possesses a peculiar property which enables it to be "restored" after being "burned;" no more should you waste any money on nostrums for restoring burned steel.

We have shown how to restore "overheated" steel.

For "burned" steel, which is oxydized steel, there is only one way of restoration, and that is through the knobbling fire or the blast furnace.

"Overheating" and "restoring" should only be allowable for purposes of experiment. The process is one of disintegration and is always injurious.

8. Be careful not to overdo the annealing process; if carried too far it does great harm; and it is one of the commonest modes of destruction which the steel maker meets in his daily troubles. It is hard to induce the average worker in steel to believe that very little annealing is necessary, and that a very little is really more efficacious than a great deal.

9. Strength of steel is reduced by being hardened in water; but both its hardness and toughness are increased by being hardened in oil. Iron heated, and suddenly cooled in water, is hardened, and the breaking strain (if gradually applied) is increased, but it is more likely to snap suddenly. It is softened and its breaking strain reduced if heated and allowed to cool gradually. Iron if brought to a white heat is injured if it be not at the same time hammered or rolled. Case-hardening bolts weakens them.

Parting Sand.—Burnt sand scraped from the surface of castings.

Loam.—Mixture of brick, clay and old foundry sand.

Blackening for Moulds.—Charcoal powder; or, in some instances, fine coal dust.

Black Wash.—Charcoal, plumbago and size.

Mixture for Welding Steel.—1 sal-ammoniac, 10 borax, pounded together, and fused until clear, when it is poured out, and, after cooling, reduced to powder.

Rust-Joint Cement.—(Quickly Setting.)—1 sal-ammoniac in powder (by weight), 2 flour of sulphur, 80 iron borings made to a paste with water.

Rust-Joint.—(Slowly Setting.)—2 sal-ammoniac, 1 flour of sulphur, 200 iron borings. The latter cement is the best if the joint is not required for immeciate use.

Case-Hardening.—Place horn, hoof, bone-dust, or shreds of leather, together with the article to be case-hardened, in an iron box subject to a blood-red heat, then immerse the article in cold water.

Case-Hardening with Prussiate of Potash.—Heat the article after polishing, to a bright red, rub the surface over with prussiate of potash; allow it to cool to dull red, and immerse it in water.

Case-Hardening Mixtures.—3 prussiate of potash, 1 sal-ammoniac. Or, 1 prussiate of potash, 2 sal-ammoniac, 2 bone-dust.

Glue to Resist Moisture.—1 pound of glue melted in 2 quarts of skim-milk.

Marine Glue.—1 of India-rubber, 12 of mineral naphtha or coal tar. Heat gently, mix, and add 20 of powdered shellac. Pour out on a slab to cool. When used, to be heated to about 250 degrees.

Glue Cement to Resist Moisture.—1 glue, 1 black rosin, ¼ red ochre. Mix with least possible quantity of water. Or, 4 of glue, or 1 oxide of iron, 1 of boiled oil (by weight.)

To Remove Rust from Steel.—Steel which has been rusted can be cleaned by brushing with a paste compound of ½ ounce cyanide potassium, ½ ounce castile soap, 1 ounce whiting, and water sufficient to form a paste. The steel should be washed with a solution of ½ ounce cyanide potassium in 2 ounces water.

To Preserve Steel from Rust.—1 caoutchouc, 16 turpentine. Dissolve with a gentle heat, then add 8 parts boiled oil. Mix by bringing them to the heat of boiling water; apply to the steel with a brush, in the way of varnish. It may be removed with turpentine.

To Clean Brass.—1 roche alum and 16 water. Mix. The articles to be cleaned must be made warm, then rubbed with the above mixture, and finished with fine tripoli.

Stone Work.

Stone walls are measured by the perch (24¾ cubic feet). Openings less than 3 feet wide are counted solid; over 3 feet deducted, but 18 inches are added to the running measure for each jamb built. Arches are counted solid from their spring. Corners of buildings are measured twice. Pillars less than 3 feet are counted on 3 sides as lineal, multiplied by fourth side and depth.

It is customary to measure all foundation and dimension stone by the cubic foot. Water tables and base courses by lineal feet. All sills and lintels or ashlar, by superficial feet, and no wall less than 18 inches thick.

The greatest safe load per superficial foot on

Granite piers	40 tons.	Brickwork in cement	3 tons.
Lime stone piers	25 tons.	Rubble masonry	2 tons.
Sand stone piers	15 tons.	Lime concrete foundations	2½ tons.

The height of brick or stone piers should not exceed 12 times their least thickness at base.

Concrete Walls.

Concrete walls for houses are built of 1 of cement to 6 or 7 of broken stone, shingle, gravel or slag. The substance mixed with the cement must be free from loam, fine sand, clay, or dirt of any kind.

To prevent the cement from adhering to the planks of the mould, apply freely to them with a brush, soap boiled to the consistency of paint.

Plastering.

Estimate of material for 100 square yards:

Material.	Two Coats Slipped Coat Finish.	Three Coats with Hard Finish.
Quicklime	3½ casks	4 casks.
Quicklime for fine stuff		⅔ cask.
Plaster of Paris		½ cask.
Laths	2000	2000.
Hair	3 bushels	4 bushels.
Common Sand	6 loads	7 loads.
White Sand		2½ bushels.
Nails	13 pounds	13 pounds.
Mason's labor	3½ days	4 days.
Laborer	2 days	3 days.

Plastering laths are usually of white or yellow pine, 1½ inches wide, ¼ inch thick, and 3 or 4 feet long. They are nailed up horizontally, about ½ inch apart. The upright stud of partitions are

spaced at such distances apart (usually about 15 inches, center to center), that the ends of the laths may be nailed to them. Laths are sold in bundles of 1000 each. A square foot of surface requires 1½ four-feet laths, or 1000 such laths will cover 666 square feet. A carpenter can nail up the laths for from 40 to 60 square yards of plastering in a day of 10 hours, depending on the number of angles in the room, etc.

Plastering is always measured by the square yard for plain work, by the superficial foot for cornices of plain members, and by lineal foot for enriched or carved mouldings in cornices.

Brick Work.

Brick work is generally measured by 1000 bricks laid in the wall. In consequence of variations in size of bricks, no rule for volume of laid brick can be exact. The following scale is, however, a fair average.

7 Bricks to a superficial foot	4-inch Wall =	40 pounds.
14 Bricks to a superficial foot	9-inch Wall =	94 pounds.
21 Bricks to a superficial foot	13-inch Wall =	121 pounds.
28 Bricks to a superficial foot	18-inch Wall =	168 pounds.
35 Bricks to a superficial foot	22-inch Wall =	210 pounds.

Corners are not measured twice as in stone work. Openings over 2 feet square are deducted. Arches are counted from the spring. Fancy work counted 1½ bricks for 1. Pillars are measured on their face only.

A cubic yard of mortar requires 1 cubic yard of sand and 9 bushels of lime, and will fill 30 hods.

One thousands bricks, closely stacked, occupy about 56 cubic feet.

One thousand old bricks, cleaned and loosely staked, occupy about 72 cubic feet.

One superficial foot of gauged arches requires 10 bricks.

Stock bricks commonly measure 8¾ inches by 4¼ inches by 2¾ inches, and weigh from 5 to 6 pounds each.

Paving bricks should measure 9 inches by 4½ inches by 1¾ inches, and weigh about 4½ pounds each.

One yard of paving requires 36 stock bricks, of above dimensions, laid flat, or 52 on edge; and 35 paving bricks laid flat, or 82 on edge.

All bricks should be wet before laying, especially in dry weather, as otherwise they take water from the mortar and thus reduce its strength—do not have bricks "dripping wet," but allow them to take all the water they will; this is especially necessary where cement mortar is used.

Painting.

For outside wood work, paint made from white lead ground in linseed oil is most used. If the oil is raw, or unboiled, dryer is added; if boiled, no dryer is necessary. Not less than four coats should be applied—five are better.

Paint ready mixed, put up in cans or keg, may be procured from manufacturers or dealers. These paints have to be thinned by adding 1 pint of oil to about 2½ pounds of paint. When thinned, 1 pound will cover about 2 square yards of first-coat, 3 yards of second, and 4 yards of each subsequent coat; or 1⅜ pounds to the square yard will be required for 4 coats, and 1⅝ pounds for the 5 coats.

For inside work, either white lead or oxide of zinc is used, and for good work 4 coats are necessary.

For iron exposed to the weather, metallic paints, such as yellow and red iron ochres or brown hematite ore, finely pulverized and mixed with oil or dryer, are best.

For iron subject to the action of water, red lead is best.

Plastered walls should stand a year before painting.

Painting is measured by the square yard, girding every part of the work that is covered by paint and allowing an addition to the actual surface for the difficulty of covering deep quirk of mouldings and for "cutting in" as in sash and shelving, or where there is a change of color, on same work.

Washes.

For outside wood work.—In a tight bushel, slack half a bushel of fresh lime by pouring over it boiling water sufficient to cover it 4 or 5 inches deep, stir until slacked; add 2 pounds of sulphate of zinc dissolved in water, add water enough to bring all to the consistency of thick whitewash.

For inside work.—Add 2 quarts of thin size to a pailful of wash just before using. The common practice of mixing salt with whitewash should not be permitted.

For brick or stone work.—Slack half bushel of lime, as before, in a barrel; then fill the barrel two-thirds full of water and add a bushel of hydraulic cement; add 3 pounds sulphate of zinc dissolved in water. These washes may be colored by adding powdered ochre, umber, etc.

Painter's Putty.—Spanish whiting, pulverized, 80.6; boiled oil, 20.4; made into a stiff paste. If not intended for immediate use, raw oil should be used. One pound of putty for stopping every 20 yards.

Glazier's Putty.—Whiting, 70 pounds; boiled oil, 30 pounds; water, 2 gallons; mixed. If too thin, add more whiting; if too thick, add more oil.

To Soften Putty.—To remove old putty from broken windows, dip a small brush in nitro-muriatic acid or caustic soda (concentrated lye), and with it annoint or paint over the dry putty that adheres to the broken glass and frames of your windows; after an hour's interval the putty will have become so soft as to be easily removable.

Useful Numbers.

Lineal feet	×	.00019	= miles.
Lineal yards	×	.0006	= miles.
Square inches	×	.007	= square feet.
Square feet	×	.111	= square yards.
Square yards	×	.0002067	= acres.
Acres	×	.4840	= square yards.
Cubic inches	×	.00058	= cubic feet.
Cubic feet	×	.03704	= cubic yards.
Circular inches	×	.00546	= square feet.
Cylindrical inches	×	.0004546	= cubic feet.
Cylindrical feet	×	.02909	= cubic yards.
Links	×	.22	= yards.
Links	×	.66	= feet.
Feet	×	1.5	= links.
Width in chains	×	8.	= acres per mile.
183,346 circular inches			= 1 square foot.
2200 cylindrical inches			= 1 cubic foot.
Cubic feet	×	7.48	= United States gallons.
Cubic inches	×	.004329	= United States gallons.
Cylindrical feet	×	5.874	= United States gallons.
Cylindrical inches	×	.0034	= United States gallons.
United States gallons	×	.13367	= cubic feet.
United States gallons	×	231.	= cubic inches.
Cubic feet	×	.8036	= United States bushel.
Cubic inches	×	.000466	= United States bushel.
United States bushel	×	.0495	= cubic yards.
United States bushel	×	1.2446	= cubic feet.
United States bushel	×	2150.42	= cubic inches.
Cylindrical feet of water	×	6.	= United States gallons.
Pounds avoirdupois	×	.009	= cwt. (112).
Pounds avoirdupois	×	.00045	= tons (2240).
Cubic feet of water	×	62.5	= pounds avoirdupois.
Cubic inches of water	×	.03617	= pounds avoirdupois.
Cylindical feet of water	×	49.1	= pounds avoirdupois.
Cylindrical inches of water	×	.02842	= pounds avoirdupois.
13.44 United States gallons of water			= 1 cwt.
268.8 United States gallons of water			= 1 ton.
1.8 cubic feet of water			= 1 cwt.
35.88 cubic feet of water			= 1 ton.
Column of water 12 inches high 1 inch diameter			= .341 pounds.

Useful Numbers in Surveying.

For Converting	Multiplier.	Converse.
Feet into links	1.515	.66
Yards into links	4.545	.22
Square feet into acres	.0000229	.43560
Square yards into acres	.0002066	.4840
Feet into miles	.00019	.5280
Yards into miles	.00057	.1760
Chains into miles	.0125	.80

Melting Points of Various Substances.

	Fahrenheit.		Fahrenheit.
Sulphurous Acid	148	Lead	608-618
Carbonic Acid	108	Zinc	680-779
Mercury	39	Antimony	810-1150
Bromine	9.5	Aluminum	1157
Nitro-Glycerine	45	Magnesium	1200
Tallow	92	Bronze	1692
Phosphorus	112	Silver	1733-1873
Potassium	136-144	Potassium Sulphate	1859
Stearic Acid	158	Gold	1913-2282
Sodium	194-208	Copper	1929-1996
Alloy, 3 lead, 2 tin, 5 bismuth	199	Cast Iron, white	1922-2075
Sulphur	239	Cast Iron, gray	2012-2786-2228
Alloy, 1½ tin, 1 lead	334	Steel	2372-2532
Alloy, 1 tin, 1 lead	370-466	Steel, hard	2570
Tin	442-446	Steel, mild	2687
Cadmium	442	Wrought Iron	2732-2912
Bismuth	504-507	Platinum	3227

To protect tall Chimneys, Steeples, etc., from Lightning.—The most approved form of conductor is a copper tape about ¾ inch by ⅛ inch, weighing 6 ounces per foot, fastened to structure with holdfasts of same material. An allowance of 1 inch in 40 feet should be made for expansion and contraction. Slight bends in the tape, not too abrupt, answer the purpose. Tape should be soldered to copper plate at least 3 feet square and $\frac{1}{16}$ inch thick buried sufficiently deep to be in damp soil.

Lubricants.—The best lubricants for different purposes are:
Low temperatures, as in rock drills driven by compressed air.—Light mineral lubricating oils.
Very great pressure, slow speed.—Graphite, soapstone and other solid lubricants.
Heavy pressure with slow speed.—The above and lard tallow or other greases.
Heavy pressure and high speed.—Sperm, castor and heavy mineral oils.
Light pressure and high speed.—Sperm, refused petroleum, olive, rape and cotton seed oils.
Ordinary machinery.—Lard oil, tallow oil, heavy mineral and vegetable oils.
Steam Cylinders.—Heavy mineral oils, lard or tallow.
Wood against wood.—Graphite or soapstone mixed with soap.

Emery Wheels.—Wheels are graded from soft to hard, grade being denoted by the letters of the alphabet, A denoting softest wheel. A wheel is soft or hard according to amount and character of material, but, other things being equal, a wheel made of fine emery is more compact and harder than one made of coarse emery. The softness of a wheel is generally its most important characteristic. A soft wheel is less apt to change the temperature in the work or to become glazed than a harder one. It is best for grinding hardened steel, cast iron, brass, copper and rubber, while a harder or more compact wheel is better for grinding soft steel and wrought iron. As a rule the harder the stock the softer the wheel required to produce a given finish. A narrow wheel should be harder than a wide wheel in proportion to its face. Emery wheels should have a speed at periphery of about 5500 feet per minute.

Measures and Weights of Various Materials—(Approximate).

One acre of bituminous coal contains 1600 tons of 2240 pounds per foot thickness of coal worked; 15 to 25 per cent. must be deducted for waste in mining.

A Bushel of Charcoal.—In 1881 the American Charcoal Iron Workers' Association adopted for use in its official publications for the standard bushel of charcoal 2748 cubic inches, or 20 pounds. A ton of charcoal is to be taken at 2000 pounds. This figure of 20 pounds to the bushel was taken as a fair average of different bushels used throughout the country, and it has since been established by laws in some States.

Ores, Earths, Etc.

13 cubic feet of ordinary gold or silver ore, in mine	1 ton, 2000 pounds.
20 cubic feet of broken quartz	1 ton, 2000 pounds.
18 feet of gravel in bank	1 ton, 2000 pounds.
27 cubic feet of gravel, when dry	1 ton, 2000 pounds.
25 cubic feet of sand	1 ton, 2000 pounds.
18 cubic feet of earth in bank	1 ton, 2000 pounds.
27 cubic feet of earth when dry	1 ton, 2000 pounds.
17 cubic feet of clay	1 ton, 2000 pounds.

Cement.

English Portland, specific gravity 1.25 to 1.51, per barrel	400 to 430 pounds.
Rosendale, United States, a struck bushel	62 to 70 lbs.

Weight of Earth Filling.—From Howe's "Retaining Walls."

	Average Weight in Pounds per Cubic Foot.
Earth, common loam, loose	72 to 80
Earth, common loam, shaken	82 to 92
Earth, common loam, rammed moderately	90 to 100
Gravel	90 to 106
Sand	90 to 106
Soft flowing mud	104 to 120
Sand, perfectly wet	118 to 129

SCREW THREADS, UNITED STATES STANDARD.

Diameter.	Pitch.	Diameter.	Pitch.	Diameter.	Pitch.	Diameter.	Pitch.	Diameter.	Pitch.
1/4	20	3/4	10	1 1/4	7	1 15/16	5	2 13/16	3 1/2
5/16	18	13/16	10	1 5/16	6	2	4 1/2	3	3 1/2
3/8	16	7/8	9	1 3/8	6	2 1/4	4 1/2	3 1/4	3 1/2
7/16	14	15/16	9	1 1/2	6	2 5/16	4 1/2	3 5/16	3 1/4
1/2	13	1	8	1 5/8	5 1/2	2 3/8	4	3 1/2	3 1/4
9/16	12	1 1/16	7	1 3/4	5	2 1/2	4	3 3/4	3
5/8	11	1 1/8	7	1 7/8	5	2 3/4	4	4	3
11/16	11	...	..	...	..	...	...	...	...

CAPACITY OF THE WIND MILL.

Designation of Mill. Wheel.	Velocity of Wind. Miles per Hour	Revolutions of Wheel. Per Minute.	GALLONS OF WATER RAISED PER MINUTE TO AN ELEVATION OF:					
			25 Feet.	50 Feet.	75 Feet.	100 Feet.	150 Feet.	200 Feet.
8½ feet.	16	70 to 75	6.162	3.016	.....	.....	.....	.....
10 feet.	16	60 to 65	19.179	9.563	6.638	4.750	.....	.....
12 feet.	16	55 to 60	33 941	17.952	11.851	8.485	5.680	.....
14 feet.	16	50 to 55	45.139	22.569	15.304	11.246	7.807	4.998
16 feet.	16	45 to 50	64.600	31.654	19.542	16.150	9.771	8.075
18 feet.	16	40 to 45	97.682	52.165	32.513	24.421	17.485	12.211
20 feet.	16	35 to 40	124.950	63.750	40.800	31.248	19.284	15.938
25 feet.	16	30 to 35	212.381	106.964	71.604	49.725	37.349	26.741

WEIGHT AND SPECIFIC GRAVITY OF VARIOUS MATERIALS.

MATERIAL.	Weight per Cubic Feet. Average. Pounds.	Specific Gravity. Average.	MATERIAL.	Weight per Cubic Feet. Average. Pounds.	Specific Gravity. Average.
Brick, common.....from	100	1.6	Granite, gray.....	163	2.62
Brick, common.....to	125	2.	Granite, red.....	165	2.62
Brick, pressed.....	134	2.16	Gypsum.....	143	2.286
Brick, fire.....	150	2 4	Iron Pyrites.....	...	4.5 to 5.5
Brickwork, in mortar...	110	....	Limestone.....	168	2.7
Brickwork, in cement...	112	....	Lime, quick.....	53	.843
Cement, Portland, loose.	78	....	Marble.....	168	2.7
Cement, Rosendale, loose	60	....	Masonry, ashlar.....	160	....
Clay.....	119	1.9	Masonry, rubble.....	180	....
Coal, anthracite.....	93.5	1.5	Mortar, average.....	106	1.7
Coal, bituminous.....	84	1.35	Quartz.....	165	2.65
Coal, cannel.....	79	1.272	Sand, river.....	117	1.88
Coke.....	46	....	Sand, coarse.....	100	1.61
Concrete, in cement.....	137	2.2	Sandstone.....	150	2.4
Concrete, ordinary.....	119	1.9	Silica.....	...	2.5
Earth.....from	77	1.52	Slate, American.....	175	2.8
Earth.....to	125	2.	Slate, Welsh.....	180	2.88
Galena.....	....	6.5 to 7.5	Sulphur.....	125	2.

WEIGHT AND SPECIFIC GRAVITY OF METALS.

METAL.	Specific Gravity. Range according to several Authorities.	Specific Gravity. Approx. Mean Value used in Calculation of Weight.	Weight Per Cubic Foot. Pounds.	Weight Per Cubic Inch. Pounds.
Aluminum	2.56 to 2.71	2.67	166.5	.0963
Antimony	6.66 to 6.86	6.76	421.6	.2439
Bismuth	9.74 to 9.90	9.82	612.4	.3454
Brass: Copper, Zinc 80 20	7.8 to 8.6	8.60	536.3	.3103
70 30		8.40	523.8	.3031
60 40		8.36	521.3	.3017
50 50		8.20	511.4	.2959
Bronze: Copper, 95–80 Tin, 5–20	8.25 to 8.96	8.853	552.	.3195
Cadmium	8.6 to 8.7	8.65	539.	.3121
Calcium	1.58	.....	.....	.....
Chromium	5.0	.....	.....	.....
Cobalt	8.5 to 8.6	.....	.....	.....
Gold, pure	19.245 to 19.361	19.258	1200.9	.6949
Copper	8.69 to 8.92	8.853	552.	.3195
Iridium	22.38 to 23.	.....	1396.	.8076
Iron, cast	6.85 to 7.48	7.218	450.	.2604
Iron, wrought	7.4 to 7.9	7.70	480.	.2779
Lead	11.07 to 11.44	11.38	709.7	.4106
Manganese	7. to 8.	8.	499.	.2887
Magnesium	1.69 to 1.75	1.75	109.	.0641
Mercury 32°	13.60 to 13.62	13.62	849.3	.4915
Mercury 60	13.58	13.58	846.8	.4900
Mercury 212	13.37 to 13.38	13.38	834.4	.4828
Nickel	8.279 to 8.93	8.8	548.7	.3175
Platinum	20.33 to 22.07	21.5	1347.	.7758
Potassium	0.865	.....	.....	.....
Silver	10.474 to 10.511	10.505	655 1	.3791
Sodium	0.97	.....	.....	.....
Steel	7.69 to 7.932	7.854	489.6	.2834
Tin	7.291 to 7.409	7.350	458.3	.2652
Titanium	5.3	.....	.....	.....
Tungsten	17. to 17.6	.....	.....	.....
Zinc	6.86 to 7.20	7.	436.5	.2526

In the first column of figures the lowest are usually those of cast metals, which are more or less porous; the highest are of metals finely rolled or drawn into wire.

WEIGHT AND SPECIFIC GRAVITY OF LIQUIDS.

	Specific Gravity.	Weight per Cubic Inch. Pounds.	Weight per Gallon. Pounds.
Water, distilled, 60 degrees Fahrenheit	1.	.036	8.35
Water, sea	1.03	.037	8.55
Water, Dead Sea	1.24	.045	10.4
Acid, Acetic	1.062	.038	8.78
Acid, Nitric	1.217	.044	10.16
Acid, Sulphuric	1.841	.067	15.48
Acid, Muriatic	1.2	.043	9.93
Alcohol, pure	.792	.029	6.7
Alcohol, proof	.916	.033	7.62
Alcohol of commerce	.833	.030	6.93
Oil, Linseed	.940	.034	7.85
Oil, Olive	.915	.033	7.62
Oil, Turpentine	.870	.031	7.16
Oil, Whale	.923	.033	7.65
Petroleum	.878	.032	7.39

We submit this Catalogue to our customers, hoping it will be a source of convenience to them, and profit to us.

The Mine and Smelter Supply Co.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
NOV 1976
SIERRA NEVADA
COLLEGE
Incline, Village,
Nevada 89450